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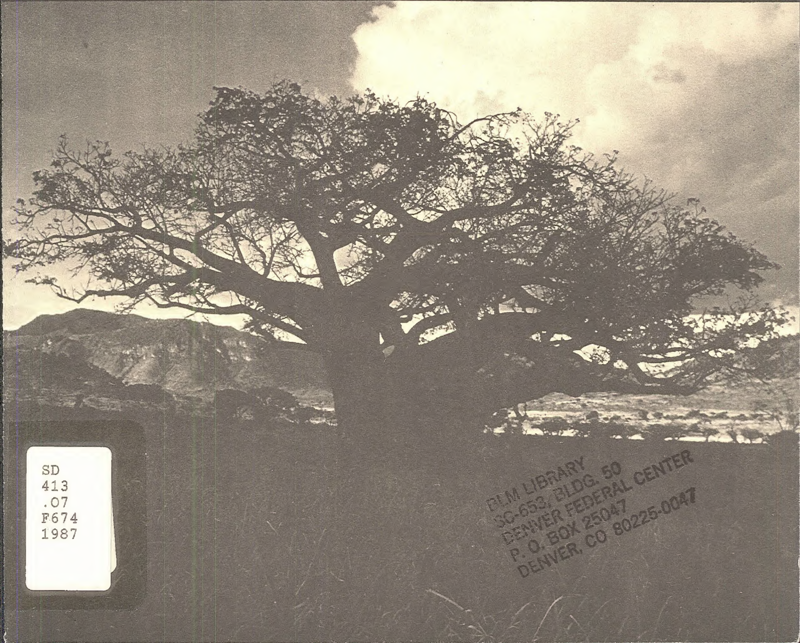
Forest Inventory Field Instructions For Western Oregon



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Forest Inventory Field Instructions For Western Oregon

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Prepared by:

Oregon State Office
Bureau of Land Management
Portland, Oregon
1983

Revised, April 1987

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Forest Inventory Field Instructions For Western Oregon

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Introduction

Purpose

The purpose of these field instructions is to provide definitions, procedures, classifications and instructions to be used by the BLM inventory teams in western Oregon. These procedures have been developed to assure uniformity of basic concepts and definitions in inventory work and comparability of resource statistics needed for national and regional appraisals of the timber situation.

The instructions cover (1) procedures for relocating and remeasuring previously established 5-point variable radius plots and (2) procedures for locating, establishing, and measuring new 5-point variable radius plots.

Objectives

The objectives of the field measurement and observation part of the basic timber inventory are to provide the resource data needed to develop economically and silviculturally sound timber management plans and action programs to meet present and anticipated future demands for timber. Achieving these objectives requires collecting and recording field data which will provide answers to the following general questions:

1. What is the area and productive capacity of the land available to grow timber?
2. What is the volume and current annual new growth on this area?
3. What is the present condition of this land and how is this condition associated with current net growth, particularly in terms of action required to measure or adjust net growth by species, age class, or tree quality?
4. How will the current net growth respond to changes in these conditions, either in the absence of disturbances or as a result of natural or manmade disturbances?

These data are summarized, analyzed, interpreted, and published in statistical and analytical reports. The reports contain data on forest land area; timber volume, growth, and mortality; timber cut; and potential productivity of forest land.

Survey Crew

Card Item 1

The field crew normally includes: an estimator (cruiser) and a recorder. A third crew member can be helpful in measuring heavy volume plots and heavily stocked plots. All crew members must be throughly acquainted with the inventory procedures and do accurate work. The crew chief directs the work of the crew and is responsible for precise and efficient work.

Equipment Checklist

Field Instructions
Plot cards
Type map of plot location
Previous plot card (on remeasured plots)
Photos (old and new on remeasured plots)
Photo pen (No grease pens)
Photo scale (Timber Survey Aid No. 16)
Compass (declination set)
Hand axe with nail pull notch
Pocket Stereoscope
6" Ruler divided into 1/20"
Tatum and tatum aids
Tags (reference and tree number)
Center pins and disks
Nails, 2½" aluminum
Prisms (30 and 80 factor)
Diameter tape
75-foot retractable tape
100-foot tape
Clinometer
Relaskop
Photoprick
Flagging
First Aid kit
Increment borer (6" and 16")
Magnifying glass
Pocket calculator

Field Data Form

All plot data will be recorded on a portable field data collector. A sample of the field data form is found in the appendix for reference. Supplemental information of interest to the District will be recorded on separate, locally prepared forms approved by OSO (931.4).

Maps

Prior to going to the field, make a copy of the type map of the plot area marked with the plot location, and include in the packet of materials to be carried in the field tatum.

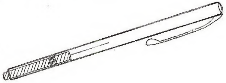
District transportation maps should also be carried in the vehicle to help locate the plot.

Preparing Aerial Photos Card Item 3

Aerial photos are used to locate the plot as pricked on the photo. On new plots the predetermined plot center will be transferred from the map to the photo, using much care in pinpricking the correct location. The field crew must then locate this exact location on the ground. Sometimes this can be very time consuming.

Remeasured plots will have two sets of aerial photos: the set used on the previous inventory and a more current set. The more current set will be pinpricked in the field, **not in the office**, since office transfer of pinpricks erroneously located on the old photos will only perpetuate the error.

Preferably, the prick should be made with a sewing needle. A handy pocket photoprick can be made by cutting off most of the extra rubber of a Faber-Castell 813-B pencil pink eraser, and with pliers, imbedding a sewing needle into the remaining eraser, as shown below:



All pinpricks and pertinent reference data should be clearly marked on the aerial photo using an oil base ink photo pen that will not smudge and is waterproof. Three such pens are the Micropoint Unimark 960, Pilot Ultra Fine Point SC-UF, and Sanford's Sharpie, Extra Fine Point Marker 0.4 mm. Oil base ink can be erased with a mylar eraser.

On the front side of the photo, mark the township, range, section, creek names, road numbers or other data that will help locate the plot in the field. In the field, the reference point and Point 1 of the plot will be circled and labeled in ink on both front and back sides of the photo.

The scale, year, symbol and number of the current photos will be recorded under CARD ITEM 3 on the field card.

Photo Scale, Azimuth and Distance

Prior to referencing or establishing the field plot location, the field crew should determine the true azimuth of the photo and the photo scale. These two items are usually completed prior to arriving at the reference location.

In order to determine the true azimuth between two points on the photo, it is necessary to first know the true azimuth of some baseline on the photos. Prior to determining this, you must know if the photo project was flown from east to west or north to south. On east-west flights, the photo numbers are printed on the west edge. North will be marked by an arrow made with a photo pen in the upper right-hand corner of the photo.

On north-south flights, which constitute most of the photo projects, north will not be marked with a photo pen. North is at the top edge where the photo number is. In developed areas, roads, fence lines, or cutting boundaries following section or forty lines will generally show on the photo. These usually run in cardinal directions and can serve as baselines. However, their true azimuth should be checked on the ground before use as a baseline. In areas where such lines do not show on the photo, a base can be quickly established by taking a compass sight between two objects or along some other line visible on both the photo and the ground or map.

Photo scale is determined from the relation between ground and photo distances. Ground distances can be obtained from maps (if accurate and detailed), land lines visible on photos, or by actually measuring the distance on the ground between two points which are easily located on the photo. Where local photo scale **has not been previously determined** and entered on the back of the photos, it will be determined on the ground by one of the following methods. **Where previously established plots are being relocated, the photo scale and orientation will be shown on the old photos and can be transferred to the new photos if necessary to locate plot.**

Method A. By trial and error, fit a multiple-scale rule to lines on the photo whose length is known on the ground or on a map, to find that photo scale which most nearly gives the same length of line or distance between points. In using this method, the ground or map distance must be in the same units as are used on the multiple scale, usually chains. Use the map chainage scale on Timber Survey Aid No. 16 to measure map distances. Roads and fence lines which are on section, quarter section, or forty lines and are thus known to be 80, 40, or 20 chains apart can be used for obtaining ground distance. These lines should be at about the same elevation as the RP and the plot. If a known distance cannot be obtained from visible land lines or from a map, it may be necessary to measure the distance between two objects on the ground which are also visible on the photo. If this is the case, lines shorter than 10 chains should be avoided if possible.

Method B. Measure the distance between two points both on the map and photo in inches and compute the scale from the formula:

$$\text{Photo Scale reciprocal} = \frac{\text{Map distance x map scale reciprocal}}{\text{photo distance}}$$

Example:

Photo distance between two points = 3.05 inches
Map distance between same two points = 1.50 inches
Map scale reciprocal = 24,000

$$\text{Photo scale reciprocal} = \frac{1.50 \times 24{,}000}{3.05} = 11{,}803.28$$

To use the photo chain, round to nearest 1,000 (i.e., 1:12,000)
Record scale on the back of the photo.

Plot Establishment

Locating Point 1 by Measurement

If the plot is to be located by measuring from a reference, the crew will first find a point on the ground, preferably a tree, in the general plot vicinity which can be readily identified on both the ground and the photo. This point is called the Reference Point or RP. **Since the RP tree is a critical item in the relocation of the sample plots, it should, if possible, be one not likely to die or be removed within the next 10 years.** Where a suitable reference tree is not available, another object may serve as an RP, e.g., a distinctive fence corner, building corner, etc. If such is used, indicate this on the photo and plot card and clearly describe it.

Locating Point 1 by Inspection

The plot location as pinpricked on the photo can be found in the field by either measuring from an identifiable reference, or by inspection. If the point can be located by inspection, do so, as it is usually more rapid and easier than measuring from a reference point. This will often be the case in open timber or when a plot falls in a small opening or edge of a woodlot, or other spot that can be located precisely by photo interpretation. Measuring the azimuth and distance to the RP and tagging the RP will be done after all 5 points are measured.

Using a stereoscope, carefully prick the base of the RP tree if visible, or where it appears to be from the crown position and shadow on the photo, and circle and label it "RP" on both front and back of the photo.

Using the local photo scale, as determined by method A or method B, and the photo-scale rule, determine the distance from the RP as pricked on the photo to the pricked plot location.

Flag the RP but do not tag it until **after** the plot has been located and established.

Using the azimuth and distance determined from the photo, measure from the RP to point 1, correcting for slope. Check the photos to see if you are at the location pinpricked on the photo. If you are not, move to the correct spot.

Where the plot was established by reference from an RP tree, after completing plot measurements, return to the RP tree initially flagged, verifying the azimuth and distance if necessary.

Where the plot was established by inspection, either measure the distance and azimuth from the center pin at point 1 to an easily locatable RP tree, or if distance or line-of-travel prohibits direct measurement, estimate the azimuth and distance to the nearest 20 feet from aerial photo measurements.

Locating Previously Measured Plots

1. Using both new and old photos, proceed to the RP tree pinpricked on the old photo (RP trees were marked with aluminum tags on two sides of the RP tree 6 feet above ground line and one aluminum tag below stump height facing in the direction of the plot location).
2. Travel notes, remarks, and description of RP tree are on front of the BLM tally sheets and the back of the old photo. (There may be times when the crew will take a different route or pinprick a different RP tree to locate the plot.) It will probably be easiest to use the new photos to arrive at the general location and the old photos to find the exact location of the RP and plot.
3. Before beginning the traverse from the RP to the plot, crews should check photos to see if the azimuth and distance seem reasonable.

   On the line between the RP and the plot, trees may have been blazed at frequent intervals. Do not put new blazes on the trees.

   Record RP information in CARD ITEM 7 on the new plot card and mark the RP tree again if necessary. Also complete CARD ITEM 6 with new route to RP information.

4. When the crew reaches the end of the traverse line, the plot should be marked. Points were marked with metal pins. Point 1 was referenced with two trees. Reference trees were marked with aluminum tags at the base. Tally trees were marked with DBH nails facing point center. If the RP's are found but not the pin, reset a new pin at the intersection of the reference lines.

   When searching for the plot, check plot card data for such things as:

   a. Remarks which say "Point center moved back 10 feet on same azimuth to agree with photo pinprick."

   b. The species type and size of trees. If the plot is in large sawtimber fir, the crew would know they were off if they were in a pole stand of hemlock.

   c. The size and species of the RP trees.

   d. Any other indicator such as slope and aspect.

5. Location of the plot will follow the same general procedures once the RP is found. However, if the RP cannot be found or if the tree pinpricked as the RP is not marked as such on the ground, follow these steps:

   a. Check the photos to be sure this is the right spot.

   b. Look for other areas which resemble this spot (stream confluences, ridges, openings, groups of large trees, etc.). Try to figure out where the previous crew might have been when they thought they were at the pinpricked location.

6. If the original plot cannot be found, establish a new 5-point plot at the correct location, using field procedures for new 5-point plots. Code CARD ITEM 13, Sample Kind, as 3.

Marking RP Tree — Card Item 7

Nail aluminum plot tags on two sides of RP tree 6 feet or higher above ground line. Also nail an aluminum plot tag on the RP tree below stump height facing the direction toward the plot location. Drive nails into tree at an upward angle and always leave at least 1 inch of nail exposed (see drawing on next page). With a ballpoint pen, scribe the RP information on this tag. Enter the symbol "RP," plot number, azimuth from RP tree to plot location to nearest degree, and scaled distance to nearest 10 feet, or, if plot is referenced by inspection, measured distance to nearest foot.

Record the RP tree species and DBH on the back of the photo and on the plot record card under CARD ITEM 7 as follows:

Species	3-digit code species of RP tree. Leave blank if not a stump or tree and write in type of RP.
DBH	Record diameter of RP tree in 10th of inches.
AZ	Record true azimuth to nearest degree from RP to sample point 1.
DIST	Record distance from RP to point 1 pin in horizontal feet.

In some cases, a second reference tree should be tagged on the road where the vehicle will be parked and the hiking begins. This is especially beneficial when the plot is over 1/2 mile hiking distance through broken terrain. The principal plot RP tree should be within 300 feet of the plot at some easily identifiable location, such as a stream crossing, major type change or clearing. Space is provided on the field card for an additional one or two RP's if more than one is needed to reference the plot.

Route to RP and Plot — Card Item 6

Under CARD ITEM 6, briefly describe the best route to the RP tree and plot. Include road numbers, names and mileage from road intersections and what side of road RP is on. If some of the route to the RP must be walked, describe distance from key road, trail, stream intersections and any distinctive cultural or topographic feature which will help to find the RP. Also, any changes since photography such as cutting and roads should be noted where these will be material aid in avoiding confusion and loss of time in relocation. The route should also be indicated on the aerial photo.

Marking Plot Reference Tree

Two tags, a minimum of six
feet above ground line with
one inch of nail exposed

One tag below stump height

Before actually establishing or remeasuring the field plot on the ground, the crew will first check that sample point 1 falls on commercial forest land. Plots will be established on commercial forest land but not be installed on noncommercial or nonforest land (see pages I-19 to I-21 for land classification definitions).

Whenever in doubt as to the correct classification of the plot, establish it and lay out all 5 points, record all information, make sketches, and/or draw type lines on the photos. Report to the supervisor that the land class of the plot was questionable.

What to do if plot is on:

1. **Commercial forest land.** Establish and record all information according to instructions.
2. **Noncommercial forest land.** Establish point 1 only of the plot. Complete CARD ITEMS 1 through 28.
3. **Nonforest land.** Do not establish plot. Complete CARD ITEMS 1 through 25, 27 and 28.

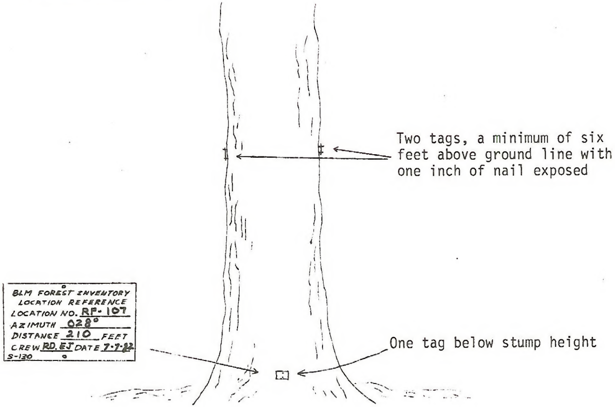
Setting The Center Pin

After being satisfied that you are at the pinpricked location and on commercial forest land, mark the point with a metal pin and a yellow 2-inch disk. With a ballpoint pen write the point number on the yellow disk.

If point 1 or any other of the 5 points at a sample location fall within a tree trunk or boulder, shift the point location back along the approach line a distance of 2 feet from the edge of the tree trunk and mark with a pin or stake and note in Remarks. Measure the distance to the next point from the pin or stake.

1. Mark all points with a wire pin placed through the hole of a 2-inch aluminum disk, leaving the aluminum disk and at least 3 inches of pin exposed with a loop at the top.
2. Pile rocks around the pin when they are available.

Marking Plot Reference Tree



Two tags, a minimum of six feet above ground line with one inch of nail exposed

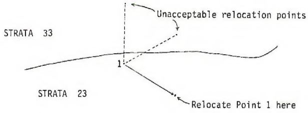
One tag below stump height

BLM FOREST INVENTORY
LOCATION REFERENCE
LOCATION NO. RP- 107
AZIMUTH 028°
DISTANCE 210 FEET
CREW RD. EJ DATE 7-7-82
S-130

Point Buffer

If point 1 of a plot on commercial forest lands falls within 40 feet of the type boundary, road, powerline or permanent stream, relocate the point 1 center pin 70 feet at zero azimuth, if possible. If an acceptable point cannot be located at zero azimuth, rotate clockwise at 60° intervals until an acceptable point can be established. If the point cannot be established following this procedure, abandon the plot location.

Example:



Referencing Points Card Item 8

After determining from the field check that the plot is on commercial forest land:

1. Select two reference trees for point 1 (stumps may be used) near the pin which form, if possible, a right angle with the pin and each other.

2. Nail an aluminum tag **below stump height** on each tree on the side facing the point center pin. Leave at least 1 inch of the nail exposed.

3. With a ballpoint pen scribe the plot and point number on the tag, e.g., 060-1.

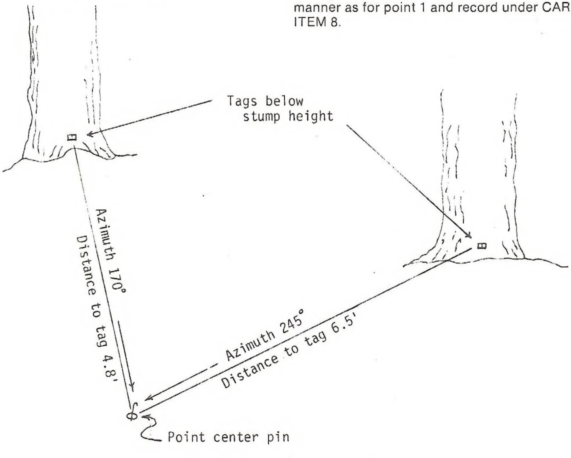
4. For each reference tree, determine and record under CARD ITEM 8:

   Point
   Species
   Diameter
   Azimuth to nearest degree from the **RP tag to the pin.**
   Slope distance to nearest 1/10 foot from **pin to tag.**

After point 1 has been established and referenced, complete the tally for the point according to instructions and proceed to subsequent points.

If there are no numbered trees on sample points 2 through 5, reference these points in the same manner as for point 1 and record under CARD ITEM 8.

Marking Point Reference Trees



Plot Design

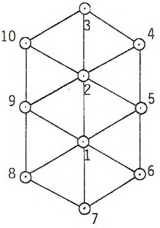
The field plot consists of 5 permanent sample points distributed over approximately 1/2 acre. At each of these points, data are collected on the species, size and quality characteristics of the trees present.

At each plot, sample point 1 is located at the point pricked on the aerial photo. Each field plot is carefully located and referenced on the ground so that it can be relocated and remeasured for subsequent reinventories. These remeasurements will provide valuable information on trends in growth, mortality, and stocking, as well as providing new inventory data. All sample points of the field plot are marked by wire pins and aluminum disks referenced to nearby trees.

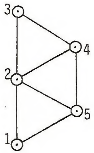
Dispersion of the sample points over the sample area permits calculating not only the total or average stocking or other condition for the sample area, but permits evaluation of the variation within the area. This makes it possible to evaluate how effectively the trees present are using the available growing space.

Commercial field plots can be one of three kinds: (1) remeasure 5 points of an existing 10-point plot, (2) remeasure 5-point plot, or (3) new 5-point plots.

10-Point Plot
(1960's Inventory)



5-Point Plot
(1970's Inventory)



All 10-point plots that were remeasured in the 1970's were converted to 5-point plots by remeasuring only 5 points. All future new plots and plot remeasurements will conform to the 5-point design.

Locating Sample Points 2 Through 5

After point 1 has been established and referenced, locate points 2 through 5 in numerical sequence using the azimuth and distance between points as shown below.

From Point	To Point	Azimuth	and Distance
1	2	0°	70 feet
2	3	0°	70 feet
3	4	120°	70 feet
4	5	180°	70 feet
5	1	240°	70 feet

Establish points 2, 3, 4 and 5 in their normal pattern, or use the rules of substitution. If it is impossible to establish the remaining 4 points in their normal pattern or by substitution, abandon the plot.

Plot Layout — Card Item 5

Make a simple sketch of the plot in the space provided under CARD ITEM 5 on the field card. Show any substitute points and the path followed in measuring the points. Also show any major cultural or topographic features near the plot, such as roads, creeks, cliffs or major type lines.

Substitute Points

If any points other than point 1 fall in another O.I. strata, on a rock outcrop over one acre in size, on improved roads, powerlines, railroads and adjoining clearings, permanent streams over 30 feet wide, or on any land not included in the inventory unit, locate a substitute point in the same strata as point 1 and mark it with a pin and aluminum disk. Smaller rock outcrops and permanent streams less than 30 feet wide will be considered part of the strata in which it is found.

Locate substitute points in the following manner:

1. Establish all points falling in same O.I. strata on the **regular** plot design. Give each point the same number it would have had on a regular plot.

2. Proceed to the highest numbered regular point and locate the lowest numbered substitute point at 70 feet, at zero azimuth if possible. If an acceptable point cannot be located at zero azimuth, rotate clockwise at 60° intervals until an acceptable point can be established.

3. Continue locating substitute points from this regular point as long as possible. Then move to the next highest numbered regular point.

4. If all regular points are used, go to the lowest numbered substitute point and repeat the procedure.

5. Show location of substitute points on plot diagram, label each number with a prime subscript, e.g., substitute point 4 is 4′.
6. Follow the same procedures for a substitute point as you would for a regular point, e.g., substitute point 3′ requires the same measurements as regular point 3.

Substituting Points on Remeasured Plots

On remeasured plots, lay out the points in the same location that the previous crew located unless:

1. There is a strata change due to harvesting or other activity that has altered the point.
2. A point was erroneously installed in a different strata in the previous inventory.
3. A point falls within 40 feet of type boundary, road, etc.

Replace altered or destroyed points with substitute points in the same manner as outlined for substitution on new plots.

If point 1 now falls on a powerline, pipeline or road or within a reserve or park, the plot will be classed as nonforest and not remeasured. Complete CARD ITEMS 1-25, 27 and 28, and include an explanation of the change in classification under CARD ITEM 9

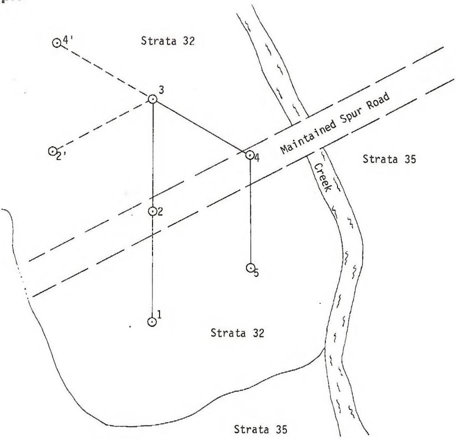
Completing Card Items 1 - 8 for Remeasured Plots

Card Items 1 through 8 will be completed for all remeasured plots, using the newest photo information (CARD ITEM 3), new route description (CARD ITEM 6), remeasured or new RP data (CARD ITEM 7), new plot sketch (CARD ITEM 5), and updated point reference data (CARD ITEM 8).

The old plot card should be carried in the tatum to help find and reconstruct the plot and to compare reasonableness of past and present measurements.

In the example below, point 1, 3 and 5 would be located in their normal location. Following the rules for substitute points, 2′ and 4′ would be located off point 5, if possible. In this illustration, however, the substitute points would violate the required 40′ buffer around each point, therefore points 2′ and 4′ would be placed 70′ from point 3 as illustrated.

Substitute Points Example



Declination **Card Item 2**

Record the distance and azimuth on the back of the photo and the Sample Plot Record along with **the compass declination used. See page II-2, CARD ITEM 10 for declinations to be used. Record declination under CARD ITEM 2.**

If local attraction seems evident, note this on the back of the photo.

Editing **Card Item 4**

The field edit should be done **before** leaving the plot.

1. Check all entries for reasonableness, completeness and legibility. MAKE SURE THAT ALL ITEMS THAT NEED TO BE COMPLETED ARE COMPLETED.
2. Make sure the correct items are recorded.
3. Make sure the correct number of digits are recorded.
4. Make sure the codes are valid.
5. Print neatly and legibly.
6. Float numbers above the line.
7. Initial the edited card under Item 4. The office editor will also initial the form when the submitted field card has been reviewed.

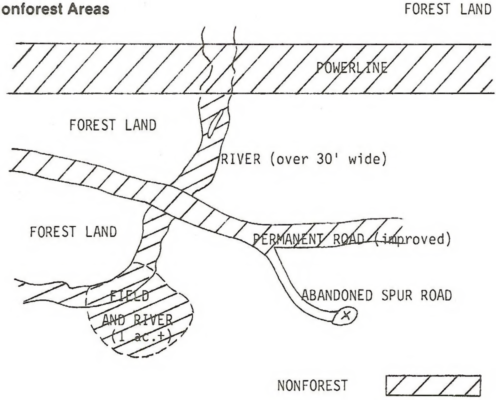
Land Classification

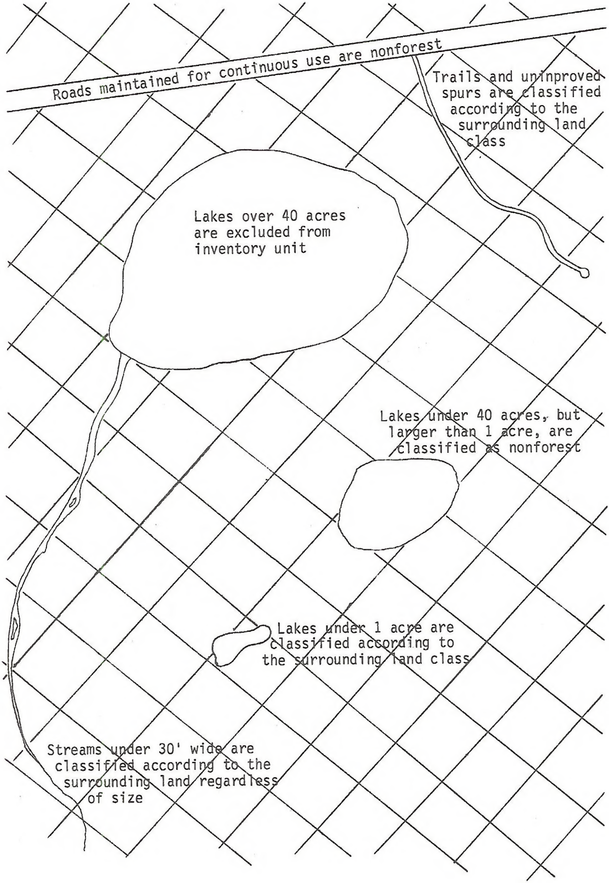
The following standards and procedures for identifying forest and non-forest areas:

For all land classes, the minimum area recognized in classification is 1 acre. Improved roads, all powerlines and cleared pipelines, right-of-way of an operating railroad, and permanent streams over 30 feet wide are classed as nonforest. An improved road, by definition, is one which is graded and maintained for continuous use. Roads not meeting these standards will be considered unimproved and will be classified according to the surrounding area.

Whenever any point falls in an island of one land class less than an acre in size, the plot will be classed according to the surrounding land class.

Example of Nonforest Areas




Roads maintained for continuous use are nonforest
Trails and uninproved spurs are classified according to the surrounding land class
Lakes over 40 acres are excluded from inventory unit
Lakes under 40 acres, but larger than 1 acre, are classified as nonforest
Lakes under 1 acre are classified according to the surrounding land class
Streams under 30' wide are classified according to the surrounding land regardless of size

Definitions of Land Use Classes

(Refer to page II-4 for appropriate codes for Present Land Use.)

Forest Land - Forest land is land which is, or is capable of being at least 10 percent stocked by forest trees (10 percent of normal yield values), and not currently developed for nontimber use.

Commercial - Commercial forest land is producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species and not withdrawn from timber utilization.

Noncommercial - Noncommercial forest land is incapable of yielding at least 20 cubic feet per acre per year because of adverse site conditions, or land unsuitable for management because of steepness and rockiness, or because of adverse location or critical watershed aspects of the site. This includes sterile or poorly drained forest land which produces stunted and deformed trees; subalpine forests at the upper limits of tree growth; steep rocky areas with cliffs, ledges, and talus slopes and forest land capable of producing only noncommercial tree species. The noncommercial forest land generally falls in one of the following classes — low site or noncommercial species.

Low site — This category includes those forest lands of such low site quality that they are incapable of producing at least 20 cubic feet per acre per year of usable wood products. Pockets of low site may occur throughout the forested area. Where this occurs, such areas will be coded low site in preference to any other class of noncommercial. For example, lands with site indexes below 40 for ponderosa pine or below 60 for Douglas-fir are generally incapable of producing 20 cubic feet per acre per year and will be considered unproductive due to low site. Dwarfed, deformed stands of lodgepole pine along the coast will also fall in this category.

Noncommercial Species — The term noncommercial species refers to certain classes of noncommercial forest land usually recognized and labled on the basis of their forest cover. This cover usually consists of noncommercial species, but may in some cases consist of commercial species of low quality and form. Areas which are currently covered by noncommercial species but which show evidence of having supported trees of commercial species and quality but which have been denuded by fire and cutting are considered commercial forest land. Four noncommercial species are recognized:

Juniper — Areas currently 10 percent or more stocked with forest trees with juniper species predominating and which are not now, and show no evidence of ever having been, 10 percent or more stocked with trees of commercial species and quality.

Scrub oak or madrone — Areas currently 10 percent or more stocked with forest trees, with low quality forest tree of oak and madrone species predominating, and which are not now, and show no evidence of ever having been, 10 percent or more stocked with trees of commercial species and quality. Trees on these sites are usually short, slow growing, gnarled, poorly formed, and generally suitable only for fuelwood.

Chaparral — Areas covered with heavily branched dwarfed trees or shrubs, usually evergreen, the crown canopy of which at maturity covers more than 50 percent of the ground, and whose primary value is watershed protection. The principal species are *Quercus, Cercocarpus, Garrya, Ceanothus, Arctostaphylos*, and *Adenostoma*. Areas in which the predominant cover is *Artemisia, Purshia, Gutierrezia, Optunia*, or semidesert species are not considered chaparral.

Willow bogs — Areas currently 10 percent or more stocked with forest trees with willow species predominating and which are not now, and show no evidence of ever having been, 10 percent or more stocked with trees of commercial species or quality. This class of land is found on low swampy sites. Willow may sometimes occupy upland commercial sites following deforestation. Such areas will not be called noncommercial willow.

Other areas can be occupied by noncommercial species such as vine maple, cherry, yew, and dogwood. These areas are generally of commercial forest quality and can be converted to commercial species. They will be classified as commercial forest land.

Productive forest land withdrawn from commercial use — land reserved from timber harvest by law or administrative decision.

Nonforest land — Land not qualifying as forest land. Includes land that has never supported forest growth and land once forest land but now developed for nontimber use such as crops, pasture, residential areas, highways, airstrips, etc. Areas of water less than 40 acres but larger than 1 acre in size, or less than 1/8 mile in width will also be classified as nonforest. Areas of water larger than 40 acres are excluded from the gross area of the inventory unit.

Cropland — Agricultural land used for growing crops. Includes row crops, dry crops, nut and fruit orchards, vineyards, seed crops including grass seeds, and hayfields.

Improved pasture — Includes land which may or may not be fenced, and has been altered by man through seeding, cultivation, irrigation, or fertilization and is being maintained as grazing land.

Natural rangeland or abandoned farmland — Vegetated land less than 10 percent stocked with trees and less than 50 percent stocked with chaparral that is not improved by man through irrigation, seeding, fertilization or cultivation; or land that has been cleared of trees or chaparral and is not now being managed.

Other farmland, including farmsteads — Agricultural land used for other than growing vegetative crops. Includes intensive farm operations and the structures that go with them such as feedlots, poultry yards, pigsties, etc.

Marsh — Wetland areas with less than 10 percent tree stocking.

Nonvegetated — Includes maintained roads, powerlines, pipelines, railroads, streams 30 feet to 120 feet wide, sand, alkali scablands, glaciers, rock, etc.

Urban and suburban — Townsites, land within city limits, areas of clustered suburbs, residential and industrial sites.

Christmas tree land — Land used for planting, culturing and harvesting of Christmas trees. Land use closely resembles cropland, except the crop is Christmas trees. Land is not used for growing wood fiber products.

Water — Streams 120 feet to 1/8 mile wide and bodies of water 1 acre to 40 acres in size. Judge stream width based on average width of stream. If a stream is over 120 feet wide on the average for a mile upstream and also downstream of the point, but stream width at the point is less than 120 feet; then consider stream width greater than 120 feet.

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Area Description and Classification

Area Description

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Area Classification

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Tally Guide for Card Items 9 - 33 .... Appendix B

Area Description

Present Condition/ Past Disturbance — Card Item 9

In the space provided under CARD ITEM 9, briefly describe the present site and stand condition, plus any past disturbance and date of occurrence if known.

Resource Management Area Code — Card Item 10

On each page of the field form under CARD ITEM 10, RMA, record a 3-digit code for identification of master unit and resource area in western Oregon as follows:

Table I

Master Unit	Resource Area	Code	East Declination
Columbia	Tillamook	111	20°
	Yamhill	112	20°
Alsea-Rickreall	Yamhill	172	19½°
	Alsea	173	19½°
Clackamas-Molalla	Clackamas	144	20°
Santiam River	Clackamas	184	19½°
	Santiam	185	19½°
Upper Willamette	McKenzie	231	19½°
	South Valley	232	19°
Siuslaw River	South Valley	243	19½°
	Coast Range	244	19½°
Douglas	North Umpqua	351	19°
	Drain	352	19°
	Dillard	353	19°
	South Umpqua	354	19°
South Umpqua	South Umpqua	344	18½°
	Dillard	343	18½°
South Coast	Umpqua River	453	19°
	Tioga	454	19°
	Myrtlewood	456	18½°
Josephine	Grants Pass	511	18½°
	Glendale	513	18½°
	Jacksonville	515	18½°
Jackson	Grants Pass	521	18½°
	Klamath	524	18½°
	Jacksonville	525	18½°
	Butte Falls	526	18½°
Klamath	Klamath	534	18½°

Record the magnetic declination under CARD ITEM 2. The declinations listed are valid from 1980 to 1990.

Plot Number — Card Item 11

Record the 3-digit plot number. Enter this number on each page used of the field form.

Card Type — Card Item 12

Precoded for keypunch use.

Sample Kind — Card Item 13

Under CARD ITEM 13, record a 1-digit code from the following:

NOTE: **5-point cluster.** This refers to commercial, noncommercial, and nonforest plots although the noncommercial and nonforest plots may not actually have 5 points laid out.

Code:

New Plot

1 **New 5-point cluster.** This is a new 5-point plot. No plot from any previous inventory was established or supposed to have been established here.

Lost Plot

3 **New 5-point cluster established in the immediate vicinity of a 5-point plot that cannot be relocated. Do not** include plots which have been completely clearcut.

Remeasured Plot

4 **Remeasured 5-point cluster.** This is a 5-point plot that has been relocated and all points are in the same location as the original plot even though the point pins may not be found. Include 5-point plots that have been completely clearcut. Also include remeasured noncommercial and nonforest plots.

Remeasured Plot, Substitute Points

5 **Remeasured 5-point cluster with relocation of one or several points.**

County Codes — Card Item 14

Under CARD ITEM 14, record a 2-digit county code:

Table II

Code	County	Code	County	Code	County
01	Baker	25	Harney	49	Morrow
03	Benton	27	Hood River	51	Multnomah
05	Clackamas	29	Jackson	53	Polk
07	Clatsop	31	Jefferson	55	Sherman
09	Columbia	33	Josephine	57	Tillamook
11	Coos	35	Klamath	59	Umatilla
13	Crook	37	Lake	61	Union
15	Curry	39	Lane	63	Wallowa
17	Deschutes	41	Lincoln	65	Wasco
19	Douglas	43	Linn	67	Washington
21	Gilliam	45	Malheur	69	Wheeler
23	Grant	47	Marion	71	Yamhill

Land Status — Card Item 15

Record a 1-digit land status code:

Code	Land Status
1	O&C
2	PD
3	CBWR

Township — Card Item 16

Record a 3-digit code for township. The first two digits will be the number of the township and the third digit will be recorded as "S" for south or "N" for north.

Example: Township five south = 05S

Range — Card Item 17

Record a 3-digit code for the range in which the plot is located. Digits one and two will be the number of the range, and digit three will be either "E" or "W" for east or west, respectively.

Section — Card Item 18

Record section as a 2-digit code.

Example: Section two = 02.

Operations Inventory Survey Unit — Card Item 19

Locate on the Operations Inventory map, the survey unit in which the plot falls. Record this 3-digit code.

Date of Past Survey — Card Item 20

Record a 4-digit code for the month and year of the previous survey. The first two digits will represent the month and the last two digits the year. Use the following codes:

Code	Month	Code	Year
01	January	75	1975
02	February	76	1976
03	March	77	1977
04	April	78	1978
05	May	79	1979
06	June	80	1980
07	July	81	1981
08	August	82	1982
09	September	83	1983
10	October	84	1984
11	November	85	1985
12	December	86	1986 etc.

For example, January 1980 would be coded 0180.

Date of Current Survey — Card Item 21

Using the above codes, record a 4-digit code for the date you are conducting the inventory.

Area Classification

Operations Inventory Strata Classes

Each district has a unique list of data point strata classes used in stratifying all land identified in the Operations Inventory. This list is inserted by each district as a supplement to these field instructions.

Predicted O.I. Strata — Card Item 22

Record a 2-digit code for the strata in which the plot is located, **as determined in the office prior to visiting the field location.** This information is usually derived from the Operations Inventory, aerial photos, timber sale folders or reforestation records.

Observed (Field) O.I. Strata Card Item 23

After arriving at point 1, record a 2-digit code **for the strata actually observed.** If different from CARD ITEM 22, note as a remark in CARD ITEM 9, why the difference occurs.

Table III

Predicted and Observed O.I. Strata Classes

Code	Description	Site Productivity	Stand Age or Classification
10	Douglas-fir	High	Nonstocked (Backlog, unplanted, etc.)
11			Pre-merch. (approx. age 1 to 30)
12			1st merch.-last CT (approx. 30-80)
13			Mature (approx. 80 to 200 years)
14			Old Growth (Age 200 plus)
15	Douglas-fir	Low	Nonstocked (Backlog, unplanted, etc.)
16			Pre-merch. (approx. age 1 to 40)
17			1st merch.-last CT (approx. 40-100)
18			Mature (approx. 100 to 200 years)
19			Old Growth (Age 200 plus)
20	Pines	High	Nonstocked (Backlog, unplanted, etc.)
21			Pre-merch. (approx. age 1 to 30)
22			1st merch.-last CT (approx. 30-80)
23			Mature (approx. 80 to 200 years)
24			Old Growth (Age 200 plus)
25	Pines	Low	Nonstocked (Backlog, unplanted, etc.)
26			Pre-merch. (approx. age 1 to 40)
27			1st merch.-last CT (approx. 40-100)
28			Mature (approx. 100 to 200 years)
29			Old Growth (Age 200 plus)
30	Other Conifers	High	Nonstocked (Backlog, unplanted, etc.)
31			Pre-merch. (approx. age 1 to 30)
32			1st merch.-last CT (approx. 30-80)
33			Mature (approx. 80 to 200 years)
34			Old Growth (Age 200 plus)
35	Other Conifers	Low	Nonstocked (Backlog, unplanted, etc.)
36			Pre-merch. (approx. age 1 to 40)
37			1st merch.-last CT (approx. 40-100)
38			Mature (approx. 100 to 200 years)
39			Old Growth (Age 200 plus)
40	Hardwoods		TPCC Woodland Suitable
41			TPCC Woodland Nonsuitable
50	Conifers		TPCC Woodland Suitable
51			TPCC Woodland Nonsuitable
60	Non-forest		

Present Land Use Card Item 24

Record a 2-digit code for the present ground land use:

	Code
Commercial Forest Land	20

	Code
Noncommercial Forest Land	40
Low site	42
Juniper	43
Scrub Oak/Madrone	44
Chapparal	45
Willow Bogs	46
Productive Forest Land Withdrawn from Commercial Use	50

	Code
Nonforest Land	60
Cropland	61
Improved Pasture	62
Natural Rangeland/Abandoned Farm	63
Other Farmland	64
Marsh	65
Nonvegetated	66
Urban and Suburban	67
Christmas Tree Land	69
Water	92

For definitions, see "Definitions of Land Use Classes", page I-12.

Past Land Use — Card Item 25

For all **remeasured plots** record a 2-digit code from the above list. **Leave this item blank for new plots.** If land use recorded for the previous inventory is different from the current land use, make sure there is a **real** change on the ground, and **explain in Remarks.**

Example:

A plot at the time of the previous inventory was called commercial forest land. No change has taken place on the plot since the previous inventory. However, because of stockability problems the plot is now classed as noncommercial. **The previous ground land use should be coded as noncommercial** because no real change has taken place.

Forest Type — Card Item 26

Forest type is the major tree species presently found on the site. Use one of these standard forest type codes:

Code		Species codes included
	Douglas-fir - Redwood	
01	Douglas-fir	(202)
71	Redwood	(211)
	Pines	
11	Ponderosa pine	(122)
12	Jeffrey pine	(116)
14	Sugar pine	(117)
16	Whitebark pine	(101)
21	Western white pine	(119)
24	Knobcone pine	(103)
61	Lodgepole pine	(108)
	True firs	
31	White fir	(015)
32	California and Shasta red fir	(021-020)
33	Grand fir	(017)
34	Pacific silver fir	(011)
36	Subalpine fir	(019)
37	Noble fir	(022)
	Spruce - hemlock	
35	Engelmann spruce	(093)
42	Sitka spruce	(098)
44	Brewer spruce	(092)
47	Mountain hemlock	(264)
48	Western hemlock	(263)
	Cedar - larch	
03	Port-Orford-cedar	(041)
41	Western redcedar	(242)
43	Alaska-cedar	(042)
15	Incense-cedar	(081)
55	Western larch	(073)
	Hardwoods	
81	Red alder	(351)
83	Aspen	(746)
84	California black oak	(818)
85	Cottonwood	(747)
86	Big leaf maple	(312)
87	Oregon white oak	(815)
88	Madrone	(361)
89	Other commercial hardwoods	(376, 378, 542, 510, 839, 352, 801, 821, 631, 431, 981)
99	Commercial nonstocked	(stocking less than 10%, 990)
	Noncommercial species	
97	Noncommercial conifers	(050, 060, 102, 104, 113, 072, 014, 127, 251, 133, 231)
98	Noncommercial hardwoods	(760, 500, 660, 492, 732, 805, 920, 999)

Physiographic Class — Card Item 27

Physiographic class is used to describe topographic features which most affect management of the area the plot is on. Record as a 3-digit code. The first digit is for aspect, second for slope, and the third digit for topographic position, as follows:

Code	Aspect	Code	Slope Percent	Code	Topograhic Position
0	Level	0	0 to 5	0	Headwall
1	N	1	6 to 15	1	Flat or rounded ridge, ridgetop or mountain peak (2 or more chains wide)
2	NE	2	16 to 25	2	Narrow ridgetop or peak (less than 2 chains wide)
3	E	3	26 to 35	3	Sidehill-upper one-third
4	SE	4	36 to 45	4	Sidehill-middle one-third
5	S	5	46 to 55	5	Sidehill-lower one-third
6	SW	6	56 to 65	6	Canyon bottom (less than 10 chains wide)
7	W	7	66 to 75	7	Bench or terrace
8	NW	8	76 to 85	8	Riparian Zone
		9	86+	9	Swamp or wet flat

Example: NE aspect, 6-15 percent slope, sidehill-upper one-third: Code - 213

Code the physioclass for the plot in general:

1. If a plot is equally on a SW, S, SE aspect, code the aspect as 5.
2. If a plot is on a SW, S, SE aspect but 4 points are on the SE aspect, code the aspect as 4.
3. If the slope of the plot changes gradually from 20 percent to 60 percent, average slope for the plot.
4. If more of the plot falls on the steeper slope, weight the slope to the steep side.
5. If a plot straddles a canyon bottom or a narrow ridge top, code as follows:

   Code the aspect of the ridge or canyon bottom.
   Code the slope of the sidehill.
   Code the topographic position of the ridge top or canyon bottom.

Elevation — Card Item 28

Record elevation as a 2-digit code. Do this in the office prior to going to the plot.

Elevation will be determined from contour maps and recorded to the nearest 100 feet. A plot elevation of 6,300 feet would be recorded as **63**; 900 feet as **09**.

Stand Age — Card Item 29

Stand age is the **average age** of the portion of the stand **that is to be managed.**

Examples:

1. Second-growth stand of 14-18 year old DF: **Record Age: 020**
2. Clearcut planted 3 years ago: **Record Age: 005**
3. 300-year old residual overstory of DF with heavily stocked understory of 15-year old hemlock - If overstory to be cut and hemlock piled: **Record Age: 300**
   - If hemlock to be grown to age 40 and clearcut: **Record Age: 010**

4. Uneven age stand of mixed species 10-120 years old, with periodic removal of risk trees: **Record Age: 120**

Record a 3-digit code, as follows:

Age Group (years)	Code	Age Group (years)	Code
0	000	56-65	060
1-05	005	66-75	070
6-15	010	76-85	080
16-25	020	86-95	090
26-35	030	96-105	100
36-45	040	106-110	110
46-55	050		etc.

Site Index Card Item 30

Selection of Site Trees - Select site trees from suitable commercial species among the dominant and codominant trees tallied. If none of the tally trees are suitable, choose other trees from nearby stands which are located on similar aspect, elevation and soils. Measure the height and age of at least three trees if available, and preferably more in young stands (less than 20 years old). Use the following guide to estimate the number of site index trees needed:

Breast Height Stand Age	No. of Site Trees Needed
5	12
10	8
20	5
30+	3

The following rules apply to site tree selection:

1. Select conifer trees only, exclusive of incense-cedar on conifer sites.
2. Select dominant and codominant trees, free from suppression.
3. When using King's 50-year D-F tables, select site trees from the **largest diameter** trees sampled in the survey, rather than by crown dominance.
4. Select trees at least 30 years old if using 100-year site tables, or 10 years old (total age) if using 50-year site tables.
5. All site trees on the plot should be of one species.
6. Red alder may be used **only** on hardwood sites (i.e. sites which will not grow conifers).
7. Site index should not vary more than 30 points between site trees unless the reason for the variation can be explained, and additional site trees are not available.
8. Site trees should be scattered throughout the plot or be in the immediate area on the same site.
9. When site trees are not available, copy site information from the old plot card and note in Remarks.
10. When no site tree information is available, write "not available" across the CARD ITEM 30 block, for site trees.
11. Douglas-fir is the preferred site species throughout its natural range in western Oregon.
12. If Douglas-fir is not a suitable site tree, select a suitable site tree from the species available.

    In the coastal spruce-hemlock zone, western hemlock followed by Sitka spruce would be the preferred species if Douglas-fir was not available.

    Crews should be especially cautious when using true firs for site trees. In many partially cut stands, the true firs that are now dominant had been once in the intermediate or overtopped crown classes and their growth reduced by competition from larger trees. Site estimates from these trees would be low. Use only large true firs that have been in the **dominant** crown class much of their lives. As a rule, never use true fir trees under 50 years old.
13. There are two 100-year site tables for Douglas-fir in the Cascade region, one for elevations below 2,500 feet and one for 2,500 feet and above.

    A third Douglas-fir table, King's 50-year site index, is based on age at breast height. This table will be used for Douglas-fir stands under 120 years age.
14. For site trees of species with no specific site index tables, use index tables as listed:

Site tree species	Use site tables for
Cedars (except incense)	Western hemlock
Sugar pine, Jeffrey pine	Ponderosa pine
Mountain hemlock	Western hemlock
Grand fir	White fir
Pacific silver fir	Western hemlock
All hardwoods	Red alder

Computation of Site Index - On the field form is a block for recording up to 12 site trees. Record all site trees in this block, **including the tallied trees selected for site measurement,** the specie (3-digit code), total age to nearest year - 3 digits (record **breast height age** if using King's 50-year site tables), total height in feet (3 digits), and site index in feet (3 digits). When the site trees are also tally trees on the plot, enter the words "site tree" in Remarks.

In the upper right corner of the field form under CARD ITEM 30, record a 6-digit code for each plot:

Columns 49-51 - (3 digits) - Site tree species numerical code. (note - there are four DF site tables; to distinguish which table was used use the following DF codes:
202 - McArdle's DF table;
203 - King's DF tables;
204 - Curtis' DF table;
205 - Scrivani DF table)

Columns 52-54 - (3 digits) - Average site index to nearest 10 feet.

Examples:

202 090 - McArdle's DF Table (202), Site Index = 90
263 130 - Table No. D, Western hemlock (263), Site Index 130
203 140 - King's DF Table (203), Site Index 140

Table IV - Site Index Tables

Table	Name of Site Index Table
	(100-year tables, except Table C)
A	McArdle: Douglas-fir below 2500' elev.
B	Curtis: Cascade Douglas-fir over 2500' elev.
C	King: 50-year second growth Douglas-fir
D	Barnes: Hemlocks, Cedar (except Incense-cedar)
E	Schumacher: Grand fir, White fir
F	Barnes: Sitka spruce
G	Brickell: Engelmann spruce
H	Mayer: Ponderosa, Jeffrey, Sugar pine
I	Dahms: Lodgepole pine
J	Brickell: Western larch
K	Worthington: All hardwoods (hardwood sites only)
L	Scrivani: Douglas-fir (S.W. Oregon)
M	Scrivani: Ponderosa Pine (S.W. Oregon

Note: Heights shown on index tables are upper limits - not mid-range values:

Example: Table A (Douglas-fir), age 50, tree height 80 feet.

Site Index = 110.

Interpolation: When tree age is between ages listed, interpolate height between **age** classes to determine site index.

Example:
Site tree is 53 years old and 105 feet tall:

	Age	**Height** (SI 130)	(SI 140)
From Table A	50	100	109
From Table A	55	107	115
Interpolated height	53	104	113

Since the 105-foot tree height is greater than the interpolated height for SI 130 (104 feet), Site Index = **140.**

TABLE A
SITE INDEX TABLES
Douglas Fir - 202[1] (in Cascades use only below 2,500′)
Upper limits of Site Indices
Dominant Trees[2]

Age years	Site Index																
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210
	Total height in feet																
20	18	21	23	25	29	32	34	36	40	42	44	47	50	53	55	58	
25	23	27	31	34	38	42	45	49	54	57	61	65	68	72	75	79	
30	29	33	38	43	48	53	57	63	67	71	77	81	86	92	96	100	
35	33	38	44	49	55	61	65	71	77	81	88	94	98	105	111	115	
40	37	44	50	56	62	68	74	80	87	93	99	106	112	118	124	131	
45	40	47	53	61	67	73	79	87	94	100	107	115	121	128	134	141	
50	43	50	57	65	71	79	86	93	100	109	115	123	130	137	145	151	
55	46	53	60	68	75	84	91	98	107	115	121	130	138	145	153	160	
60	49	57	64	71	79	88	96	103	112	120	128	137	145	153	161	169	
65	50	58	67	74	84	92	100	109	117	128	134	143	151	159	168	178	
70	52	60	69	77	87	96	105	113	121	137	140	149	157	165	175	184	
75	53	62	71	80	90	99	108	117	126	139	145	154	162	171	181	190	
80	55	65	74	84	92	102	111	120	130	141	149	159	167	176	186	196	
85	56	66	76	86	94	105	114	123	134	145	153	163	172	182	192	202	
90	58	68	78	88	97	107	117	128	139	148	157	167	178	187	197	207	
95	58	68	78	90	99	109	119	130	141	151	161	171	182	191	202	211	
100	60	70	81	91	101	112	122	133	144	154	164	174	185	195	206	216	
105	60	71	82	92	102	114	124	135	147	157	167	178	188	199	209	219	
110	61	72	83	94	105	118	127	138	149	159	169	181	192	203	213	223	
115	62	73	84	95	107	117	128	140	151	161	171	184	194	205	216	226	
120	63	74	85	96	108	119	130	142	153	163	174	186	196	208	219	230	
125	63	74	86	97	109	120	132	143	154	165	175	188	199	210	221	232	
130	64	76	87	98	110	121	133	145	155	167	178	190	201	212	223	235	
135	64	76	87	99	111	122	134	146	157	168	180	191	203	213	225	236	
140	64	76	88	100	111	123	135	147	158	169	181	192	205	215	228	238	
145	65	77	88	100	112	124	137	147	159	170	182	193	206	217	229	240	
150	65	77	89	101	113	126	137	148	160	171	183	194	207	218	230	242	
155	66	78	89	102	113	126	138	149	161	172	184	195	208	219	231	243	
160	67	79	90	102	114	127	139	150	161	173	185	196	209	220	232	244	
165	66	78	90	102	115	128	140	151	163	174	186	196	211	223	234	247	
170	66	78	91	103	115	128	141	153	164	175	188	201	213	225	237	250	
175	68	80	92	105	118	129	142	154	165	178	190	203	215	228	240	253	
180	67	80	93	105	117	130	143	155	167	179	191	204	217	230	242	256	
185	68	81	93	106	118	131	144	156	168	180	192	205	217	230	242	257	
190	70	82	94	107	119	132	145	157	169	181	193	206	218	231	243	257	
200	72	84	97	109	121	134	146	158	170	183	195	208	219	232	244	257	
225	73	86	98	111	123	137	149	161	173	186	200	212	224	237	249	263	
250	76	88	101	114	127	140	152	163	178	190	204	216	230	242	255	268	
275	76	89	102	115	128	142	154	166	180	193	207	219	233	245	258	272	
300	76	90	103	116	130	144	156	169	183	196	210	222	236	248	261	275	
325	77	90	104	117	131	145	157	171	184	199	211	224	238	250	264	278	
350	77	91	104	118	132	146	159	172	186	200	213	226	240	254	267	282	
375	78	91	105	119	133	147	161	173	188	201	215	229	242	257	269	285	
400	78	92	106	120	134	148	152	175	189	203	216	231	244	259	273	288	
Cubic foot site class[3]	7	6	5				4		3				2				

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[1] Source: McArdle, Bulletin 201, October 1949.

[2] Site indices 50, 60 and 70 adjusted in March 1974, to fit improved extrapolation of low Douglas Fir sites.

[3] Cubic foot site class revised in 1974 to agree with Teply, 1971.

TABLE B
SITE INDEX TABLE
Cascade Douglas Fir[1] (over 2,500′ elevation)

Age Years	Site index											
	50	60	70	80	90	100	110	120	130	140	150	160	170
20	-5.5	-.2	5.0	9.8	15.1	20.3	25.6	29.5	36.2	41.0	45.8	51.5	
30	1.9	8.4	14.9	20.9	27.4	33.9	40.4	45.2	53.5	59.4	65.3	72.5	
40	11.4	18.9	26.4	33.2	40.6	48.1	55.6	61.0	70.5	77.3	84.1	92.3	
50	21.4	29.5	37.7	45.1	53.2	61.4	69.5	75.4	85.8	93.2	100.6	109.5	
60	30.8	39.4	48.1	55.9	64.6	73.2	81.9	88.2	99.2	107.0	114.9	124.3	
70	39.2	48.3	57.4	65.7	74.8	83.8	92.9	99.5	111.1	119.4	127.6	137.5	
80	46.7	56.2	65.7	74.4	83.9	93.4	103.0	109.9	122.0	130.7	139.4	149.8	
90	53.0	63.0	73.0	82.1	92.1	102.1	112.1	119.4	132.1	141.2	150.3	161.2	
100	58.0	68.5	79.1	88.7	99.2	109.7	120.3	127.9	141.3	150.9	160.5	172.0	
110	61.9	73.1	84.3	94.5	105.6	116.8	128.0	136.1	150.4	160.5	170.7	182.9	
120	65.0	76.7	88.5	99.2	111.0	122.8	134.5	143.1	158.1	168.8	179.5	192.3	
130	67.5	79.8	92.0	103.2	115.4	127.7	140.0	148.9	164.5	175.6	186.8	200.2	
140	69.8	82.5	95.2	106.8	119.5	132.2	144.9	154.1	170.3	181.9	193.4	207.3	
150	71.9	85.0	98.2	110.1	123.2	136.3	149.5	159.0	175.7	187.7	199.6	213.9	
160	73.7	87.2	100.8	113.1	126.6	140.1	153.6	163.5	180.7	193.0	205.3	220.1	
170	75.1	89.1	103.0	115.6	129.5	143.4	157.4	167.5	185.2	197.8	210.5	225.6	
180	76.3	90.6	104.8	117.8	132.1	146.4	160.7	171.1	189.2	202.2	215.2	230.8	
190	77.2	91.9	106.5	119.8	134.5	149.1	163.8	174.4	193.1	206.4	219.7	235.7	
200	78.1	93.1	108.1	121.8	136.7	151.7	166.7	177.6	196.7	210.4	224.0	240.4	
210	79.0	94.3	109.7	123.6	139.0	154.3	169.7	180.8	200.3	214.3	228.2	245.0	
220	79.9	95.6	111.3	125.5	141.2	156.9	172.6	184.0	203.9	218.2	232.4	249.5	
230	80.8	96.9	112.9	127.4	143.4	159.4	175.5	187.1	207.5	222.0	236.6	254.1	
240	81.8	98.2	114.5	129.3	145.7	162.0	178.4	190.2	211.0	225.9	240.7	258.6	
250	82.8	99.5	116.1	131.3	148.0	164.6	181.3	193.4	214.6	229.7	244.9	263.1	
260	83.9	100.8	117.8	133.3	150.2	167.2	184.2	196.6	218.2	233.6	249.0	267.6	
270	84.9	102.2	119.5	135.3	152.5	169.8	187.1	199.7	221.7	237.5	253.2	272.0	
280	86.0	103.6	121.3	137.3	154.9	172.5	190.1	202.9	225.3	241.3	257.3	276.5	
290	87.2	105.1	123.0	139.3	157.2	175.1	193.0	206.1	228.9	245.1	261.4	281.0	
300	88.3	106.5	124.7	141.3	159.5	177.8	196.0	209.2	232.4	249.0	265.6	285.4	
Cubic foot site class	7	6	5				4		3				2

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[1] Source: Curtis, Herman, Demars

TABLE C
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 5												
	50	52	54	56	58	60	62	64	66	68	70	72	74
5	8.8	9.0	9.1	9.3	9.4	9.6	9.8	9.9	10.1	10.2	10.4	10.6	10.7
6	9.7	9.9	10.1	10.3	10.5	10.7	10.9	11.2	11.4	11.6	11.8	12.0	12.2
7	10.6	10.9	11.2	11.4	11.7	11.9	12.2	12.5	12.7	13.0	13.3	13.5	13.8
8	11.5	11.8	12.1	12.5	12.8	13.1	13.4	13.7	14.0	14.4	14.7	15.0	15.3
9	12.5	12.9	13.3	13.7	14.0	14.4	14.7	15.1	15.5	15.9	16.3	16.6	17.0
10	**13.6**	**14.0**	**14.4**	**14.9**	**15.3**	**15.7**	**16.1**	**16.5**	**17.0**	**17.4**	**17.8**	**18.3**	**18.7**
11	14.8	15.3	15.8	16.3	16.7	17.2	17.7	18.2	18.7	19.1	19.6	20.1	20.6
12	16.1	16.6	17.1	17.7	18.2	18.7	19.3	19.8	20.3	20.9	21.4	22.0	22.5
13	17.3	17.9	18.5	19.1	19.7	20.2	20.8	21.4	22.0	22.6	23.2	23.8	24.4
14	18.6	19.2	19.8	20.5	21.1	21.7	22.4	23.0	23.7	24.3	24.9	25.6	26.3
15	**19.8**	**20.5**	**21.2**	**21.8**	**22.5**	**23.2**	**23.9**	**24.6**	**25.3**	**26.0**	**26.7**	**27.4**	**28.1**
16	21.0	21.7	22.5	23.2	23.9	24.7	25.4	26.2	26.9	27.6	28.4	29.1	29.9
17	22.2	23.0	23.7	24.5	25.3	26.1	26.9	27.7	28.5	29.3	30.1	30.9	31.7
18	23.3	24.2	25.0	25.9	26.7	27.5	28.4	29.2	30.1	30.9	31.7	32.6	33.5
19	24.5	25.4	26.3	27.1	28.0	28.9	29.8	30.7	31.6	32.5	33.4	34.3	35.2
20	**25.6**	**26.5**	**27.5**	**28.4**	**29.3**	**30.3**	**31.2**	**32.2**	**33.1**	**34.0**	**35.0**	**35.9**	**36.9**
21	26.7	27.7	28.7	29.7	30.6	31.6	32.6	33.6	34.6	35.6	36.5	37.5	38.5
22	27.8	28.8	29.8	30.9	31.9	32.9	34.0	35.0	36.0	37.0	38.1	39.1	40.1
23	28.8	29.9	31.0	32.1	33.1	34.2	35.3	36.4	37.4	38.5	39.6	40.7	41.7
24	29.9	31.0	32.1	33.2	34.3	35.5	36.6	37.7	38.8	39.9	41.0	42.2	43.3
25	**30.9**	**32.0**	**33.2**	**34.4**	**35.5**	**36.7**	**37.9**	**39.8**	**40.2**	**41.3**	**42.5**	**43.7**	**44.8**
26	31.9	33.1	34.3	35.5	36.7	37.9	39.1	40.3	41.5	42.7	43.9	45.1	46.3
27	32.8	34.1	35.3	36.6	37.8	39.1	40.3	41.6	42.8	44.1	45.3	46.5	47.8
28	33.8	35.1	36.4	37.7	38.9	40.2	41.5	42.8	44.1	45.4	46.6	47.9	49.2
29	34.7	36.0	37.4	38.7	40.0	41.3	42.7	44.0	45.3	46.6	48.0	49.3	50.6
30	**35.6**	**37.0**	**38.3**	**39.7**	**41.1**	**42.4**	**43.8**	**45.2**	**46.5**	**47.9**	**49.3**	**50.6**	**52.0**
31	36.5	37.9	39.3	40.7	42.1	43.5	44.9	46.3	47.7	49.1	50.5	51.9	53.3
32	37.4	38.8	40.2	41.7	43.1	44.5	46.0	47.4	48.9	50.3	51.8	53.2	54.6
33	38.2	39.7	41.2	42.6	44.1	45.6	47.1	48.5	50.0	51.5	53.0	54.4	55.9
34	39.0	40.5	42.0	43.6	45.1	46.6	48.1	49.6	51.1	52.6	54.1	55.7	57.2
35	**39.8**	**41.4**	**42.9**	**44.5**	**46.0**	**47.6**	**49.1**	**50.7**	**52.2**	**53.8**	**55.3**	**56.8**	**58.4**
36	40.6	42.2	43.8	45.4	47.0	48.5	50.1	51.7	53.3	54.8	56.4	58.0	59.6
37	41.4	43.0	44.6	46.2	47.9	49.5	51.1	52.7	54.3	55.9	57.5	59.2	60.8
38	42.1	43.8	45.4	47.1	48.7	50.4	52.0	53.7	55.3	57.0	58.6	60.3	61.9
39	42.9	44.6	46.2	47.9	49.6	51.3	53.0	54.6	56.3	58.0	59.7	61.4	63.0
40	**43.6**	**45.3**	**47.0**	**48.7**	**50.5**	**52.2**	**53.9**	**55.6**	**57.3**	**59.0**	**60.7**	**62.4**	**64.1**
41	44.3	46.0	47.8	49.5	51.3	53.0	54.8	56.5	58.2	60.0	61.7	63.5	65.2
42	45.0	46.8	48.5	50.3	52.1	53.9	55.6	57.4	59.2	60.9	62.7	64.5	66.3
43	45.7	47.5	49.3	51.1	52.9	54.7	56.5	58.3	60.1	61.9	63.7	65.5	67.3
44	46.3	48.2	50.0	51.8	53.7	55.5	57.3	59.2	61.0	62.8	64.6	66.5	68.3
45	**47.0**	**48.8**	**50.7**	**52.6**	**54.4**	**56.3**	**58.1**	**60.0**	**61.9**	**63.7**	**65.6**	**67.4**	**69.3**
46	47.6	49.5	51.4	53.3	55.2	57.0	58.9	60.8	62.7	64.6	66.5	68.4	70.3
47	48.2	50.1	52.0	54.0	55.9	57.8	59.7	61.6	63.6	65.5	67.4	69.3	71.2
48	48.8	50.8	52.7	54.7	56.6	58.5	60.5	62.4	64.4	66.3	68.3	70.2	72.2
49	49.4	51.4	53.4	55.3	57.3	59.3	61.2	63.2	65.2	67.2	69.1	71.1	73.1
50	**50.0**	**52.0**	**54.0**	**56.0**	**58.0**	**60.0**	**62.0**	**64.0**	**66.0**	**68.0**	**70.0**	**72.0**	**74.0**
51	50.6	52.6	54.6	56.6	58.7	60.7	62.7	64.7	66.8	68.8	70.8	72.8	74.9
52	51.1	53.2	55.2	57.3	59.3	61.4	63.4	65.5	67.5	69.6	71.6	73.7	75.7
53	51.7	53.7	55.8	57.9	60.0	62.0	64.1	66.2	68.3	70.3	72.4	74.5	76.6
54	52.2	54.3	56.4	58.5	60.6	62.7	64.8	66.9	69.0	71.1	73.2	75.3	77.4
55	**52.7**	**54.8**	**57.0**	**59.1**	**61.2**	**63.3**	**65.5**	**67.6**	**69.7**	**71.8**	**74.0**	**76.1**	**78.2**
56	53.2	55.4	57.5	59.7	61.8	64.0	66.1	68.3	70.4	72.6	74.7	76.9	79.0
57	53.7	55.9	58.1	60.3	62.4	64.6	66.8	68.9	71.1	73.3	75.5	77.6	79.8
58	54.2	56.4	58.6	60.8	63.0	65.2	67.4	69.6	71.8	74.0	76.2	78.4	80.6
59	54.7	56.9	59.1	61.4	63.6	65.8	68.0	70.2	72.5	74.7	76.9	79.1	81.3
60	**55.2**	**57.4**	**59.7**	**61.9**	**64.2**	**66.4**	**68.6**	**70.9**	**73.1**	**75.4**	**77.6**	**79.8**	**82.1**
61	55.7	57.9	60.2	62.5	64.7	67.0	69.2	71.5	73.8	76.0	78.3	80.5	82.8
62	56.1	58.4	60.7	63.0	65.2	67.5	69.8	72.1	74.4	76.7	79.0	81.2	83.5
63	56.6	58.9	61.2	63.5	65.8	68.1	70.4	72.7	75.0	77.3	79.6	81.9	84.2
64	57.0	59.3	61.7	64.0	66.3	68.6	71.0	73.3	75.6	77.9	80.3	82.6	84.9

Source: James E. King, Weyerhaeuser Forestry Paper No. 8, 1966, "Site Index Curves for Douglas-fir in the Pacific Northwest".

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 5												
	50	52	54	56	58	60	62	64	66	68	70	72	74
65	57.4	59.8	62.1	64.5	66.8	69.2	71.5	73.9	76.2	78.6	80.9	83.3	85.6
66	57.9	60.2	62.6	65.0	67.3	69.7	72.1	74.4	76.8	79.2	81.5	83.9	86.3
67	58.3	60.7	63.0	65.4	67.8	70.2	72.6	75.0	77.4	79.8	82.1	84.5	86.9
68	58.7	61.1	63.5	65.9	68.3	70.7	73.1	75.5	77.9	80.3	82.8	85.2	87.6
69	59.1	61.5	63.9	66.4	68.8	71.2	73.6	76.1	78.5	80.9	83.4	85.8	88.2
70	**59.5**	**61.9**	**64.4**	**66.8**	**69.3**	**71.7**	**74.1**	**78.6**	**79.0**	**81.5**	**83.9**	**86.4**	**88.8**
71	59.9	62.3	64.8	67.3	69.7	72.2	74.6	77.1	79.6	82.0	84.5	87.0	89.5
72	60.3	62.7	65.2	67.7	70.2	72.6	75.1	77.6	80.1	82.6	85.1	87.6	90.1
73	60.6	63.1	65.6	68.1	70.6	73.1	75.6	78.1	80.6	83.1	85.6	88.1	90.6
74	61.0	63.5	66.0	68.6	71.1	73.6	76.1	78.6	81.1	83.7	86.2	88.7	91.2
75	**61.4**	**63.9**	**66.4**	**69.0**	**71.5**	**74.0**	**76.6**	**79.1**	**81.6**	**84.2**	**86.7**	**89.3**	**91.8**
76	61.7	64.3	66.8	69.4	71.9	74.5	77.0	79.6	82.1	84.7	87.2	89.8	92.4
77	62.1	64.7	67.2	69.8	72.3	74.9	77.5	80.0	82.6	85.2	87.8	90.3	92.9
78	62.4	65.0	67.6	70.2	72.7	75.3	77.9	80.5	83.1	85.7	88.3	90.9	93.5
79	62.8	65.4	68.0	70.6	73.2	75.7	78.3	81.0	83.6	86.2	88.8	91.4	94.0
80	**63.1**	**65.7**	**68.3**	**70.9**	**73.5**	**76.2**	**78.8**	**81.4**	**84.0**	**86.7**	**89.3**	**91.9**	**94.6**
81	63.4	66.1	68.7	71.3	73.9	76.6	79.2	81.8	84.5	87.1	89.8	92.4	95.1
82	63.8	66.4	69.0	71.7	74.3	77.0	79.6	82.3	84.9	87.6	90.3	92.9	95.6
83	64.1	66.7	69.4	72.1	74.7	77.4	80.0	82.7	85.4	88.1	90.7	93.4	96.1
84	64.4	67.1	69.7	72.4	75.1	77.8	80.4	83.1	85.8	88.5	91.2	93.9	96.6
85	**64.7**	**67.4**	**70.1**	**72.8**	**75.5**	**78.1**	**80.8**	**83.5**	**86.2**	**89.0**	**91.7**	**94.4**	**97.1**
86	65.0	67.7	70.4	73.1	75.8	78.5	81.2	83.9	86.7	89.4	92.1	94.8	97.6
87	65.3	68.0	70.7	73.5	76.2	78.9	81.6	84.3	87.1	89.8	92.6	95.3	98.0
88	65.6	68.3	71.1	73.8	76.5	79.2	82.0	84.7	87.5	90.2	93.0	95.7	98.5
89	65.9	68.6	71.4	74.1	76.9	79.6	82.4	85.1	87.9	90.7	93.4	96.2	99.0
90	**66.2**	**68.9**	**71.7**	**74.5**	**77.2**	**80.0**	**82.7**	**85.5**	**88.3**	**91.1**	**93.9**	**96.6**	**99.4**
91	66.5	69.2	72.0	74.8	77.5	80.3	83.1	85.9	88.7	91.5	94.3	97.1	99.9
92	66.7	69.5	72.3	75.1	77.9	80.7	83.5	86.3	89.1	91.9	94.7	97.5	100.3
93	67.0	69.8	72.6	75.4	78.2	81.0	83.8	86.6	89.5	92.3	95.1	97.9	100.8
94	67.3	70.1	72.9	75.7	78.5	81.3	84.2	87.0	89.8	92.7	95.5	98.3	101.2
95	**67.5**	**70.4**	**73.2**	**76.0**	**78.8**	**81.7**	**84.5**	**87.4**	**90.2**	**93.0**	**95.9**	**98.8**	**101.6**
96	67.8	70.6	73.5	76.3	79.2	82.0	84.8	87.7	90.6	93.4	96.3	99.2	102.0
97	68.1	70.9	73.8	76.6	79.5	82.3	85.2	88.0	90.9	93.8	96.7	99.6	102.5
98	68.3	71.2	74.0	76.9	79.8	82.6	85.5	88.4	91.3	94.2	97.1	99.9	102.9
99	68.6	71.4	74.3	77.2	80.1	82.9	85.8	88.7	91.6	94.5	97.4	100.3	103.3
100	**68.8**	**71.7**	**74.6**	**77.5**	**80.4**	**83.2**	**86.2**	**89.1**	**92.0**	**94.9**	**97.8**	**100.7**	**103.7**
101	69.1	72.0	74.8	77.8	80.6	83.6	86.5	89.4	92.3	95.2	98.2	101.1	104.1
102	69.3	72.2	75.1	78.0	80.9	83.9	86.8	89.7	92.7	95.6	98.5	101.5	104.4
103	69.5	72.5	75.4	78.3	81.2	84.1	87.1	90.0	93.0	95.9	98.9	101.8	104.8
104	69.8	72.7	75.6	78.6	81.5	84.4	87.4	90.3	93.3	96.3	99.2	102.2	105.2
105	**70.0**	**72.9**	**75.9**	**78.8**	**81.8**	**84.7**	**87.7**	**90.7**	**93.6**	**96.6**	**99.6**	**102.6**	**105.6**
106	70.2	73.2	76.1	79.1	82.0	85.0	88.0	91.0	94.0	96.9	99.9	102.9	105.9
107	70.5	73.4	76.4	79.3	82.3	85.3	88.3	91.3	94.3	97.3	100.3	103.3	106.3
108	70.7	73.6	76.6	79.6	82.6	85.6	88.6	91.6	94.6	97.6	100.6	103.6	106.7
109	70.9	73.9	76.9	79.9	82.8	85.8	88.8	91.9	94.9	97.9	100.9	104.0	107.0
110	**71.1**	**74.1**	**77.1**	**80.1**	**83.1**	**86.1**	**89.1**	**92.1**	**95.2**	**98.2**	**101.2**	**104.3**	**107.4**
111	71.3	74.3	77.3	80.3	83.4	86.4	89.4	92.4	95.5	98.5	101.6	104.6	107.7
112	71.5	74.5	77.6	80.6	83.6	86.6	89.7	92.7	95.8	98.8	101.9	104.9	108.0
113	71.7	74.8	77.8	80.8	83.9	86.9	89.9	93.0	96.1	99.1	102.2	105.3	108.4
114	71.9	75.0	78.0	81.1	84.1	87.1	90.2	93.3	96.4	99.4	102.5	105.6	108.7
115	**72.1**	**75.2**	**78.2**	**81.3**	**84.3**	**87.4**	**90.5**	**93.5**	**96.6**	**99.7**	**102.8**	**105.9**	**109.0**
116	72.3	75.4	78.4	81.5	84.6	87.6	90.7	93.8	96.9	100.0	103.1	106.2	109.3
117	72.5	75.6	78.7	81.7	84.8	87.9	91.0	94.1	97.2	100.3	103.4	106.5	109.7
118	72.7	75.8	78.9	82.0	85.1	88.1	91.2	94.3	97.5	100.6	103.7	106.8	110.0
119	72.9	76.0	79.1	82.2	85.3	88.4	91.5	94.6	97.7	100.9	104.0	107.1	110.3
120	**73.1**	**76.2**	**79.3**	**82.4**	**85.5**	**88.6**	**91.7**	**94.9**	**98.0**	**101.1**	**104.3**	**107.4**	**110.6**

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 4									
	76	78	80	82	84	86	88	90	92	94
5	10.9	11.1	11.3	11.4	11.6	11.8	12.0	12.1	12.3	12.5
6	12.5	12.7	12.9	13.1	13.3	13.6	13.8	14.1	14.3	14.5
7	14.1	14.4	14.6	14.9	15.2	15.5	15.8	16.1	16.3	16.6
8	15.7	16.0	16.3	16.7	17.0	17.4	17.7	18.0	18.4	18.7
9	17.4	17.8	18.2	18.5	18.9	19.3	19.7	20.1	20.5	20.9
10	**19.1**	**19.6**	**20.0**	**20.4**	**20.9**	**21.4**	**21.8**	**22.3**	**22.7**	**23.2**
11	21.1	21.6	22.1	22.6	23.1	23.6	24.1	24.6	25.1	25.6
12	23.0	23.6	24.1	24.7	25.2	25.8	26.4	26.9	27.4	28.0
13	25.0	25.6	26.2	26.8	27.4	28.0	28.6	29.2	29.8	30.4
14	26.9	27.5	28.2	28.8	29.5	30.2	30.8	31.5	32.1	32.8
15	**28.8**	**29.5**	**30.2**	**30.9**	**31.6**	**32.3**	**33.0**	**33.7**	**34.4**	**35.1**
16	30.6	31.4	32.1	32.9	33.7	34.4	35.2	35.9	36.7	37.4
17	32.5	33.3	34.1	34 9	35.7	36.5	37.3	38.1	38.9	39.7
18	34.3	35.2	36.0	36.8	37.7	38.5	39.4	40.3	41.1	42.0
19	36.1	37.0	37.9	38.8	39.7	40.6	41.4	42.3	43.2	44.2
20	**37.8**	**38.7**	39.7	**40.6**	**41.6**	**42.5**	**43.4**	**44.4**	**45.4**	**46.3**
21	39.5	40.5	41.5	42.5	43.5	44.4	45.4	46.4	47.4	48.4
22	41.2	42.2	43.3	44.3	45.3	46.3	47.4	48.4	49.4	50.5
23	42.8	43.9	45.0	46.1	47.1	48.2	49.3	50.3	51.4	52.5
24	44.4	45.5	46.7	47.8	48.9	50.0	51.1	52.3	53.4	54.5
25	**46.0**	**47.2**	**48.3**	**49.5**	**50.6**	**51.8**	**52.9**	**54.1**	**55.3**	**56.5**
26	47.5	48.7	49.9	51.1	52.3	53.6	54.7	55.9	57.1	58.4
27	49.0	50.3	51.5	52.7	54.0	55.3	56.5	57.7	59.0	60.2
28	50.5	51.8	53.1	54.3	55.6	56.9	58.2	59.5	60.8	62.1
29	51.9	53.3	54.6	55.9	57.2	58.5	59.9	61.2	62.5	63.9
30	**53.3**	**54.7**	**56.1**	**57.4**	**58.8**	**60.2**	**61.5**	**62.9**	**64.2**	**65.6**
31	54.7	56.1	57.5	58.9	60.3	61.7	63.1	64.5	65.9	67.3
32	56.1	57.5	58.9	60.4	61.8	63.2	64.7	66.1	67.6	69.0
33	57.4	58.8	60.3	61.8	63.3	64.7	66.2	67.7	69.2	70.6
34	58.6	60.2	61.7	63.2	64.7	66.2	67.7	69.2	70.7	72.2
35	**59.9**	**61.5**	**63.0**	**64.5**	**66.1**	**67.6**	**69.2**	**70.7**	**72.3**	**73.8**
36	61.1	62.7	64.3	65.9	67.5	69.0	70.6	72.2	73.8	75.4
37	62.4	64.0	65.6	67.2	68.8	70.4	72.0	73.6	75.2	76.9
38	63.5	65.2	66.8	68.5	70.1	71.8	73.4	75.0	76.7	78.4
39	64.7	66.4	68.1	69.7	71.4	73.1	74.8	76.4	78.1	79.8
40	**65.8**	**67.6**	**69.3**	**71.0**	**72.7**	**74.4**	**76.1**	**77.8**	**79.5**	**81.2**
41	66.9	68.7	70.4	72.2	73.9	75.7	77.4	79.1	80.9	82.6
42	68.0	69.8	71.6	73.4	75.1	76.9	78.6	80.4	82.2	84.0
43	69.1	70.9	72.7	74.5	76.3	78.1	79.9	81.7	83.5	85.3
44	70.1	72.0	73.8	75.7	77.5	79.3	81.1	83.0	84.8	86.6
45	**71.2**	**73.1**	**74.9**	**76.7**	**78.6**	**80.5**	**82.3**	**84.2**	**86.1**	**87.9**
46	72.2	74.1	76.0	77.8	79.7	81.6	83.5	85.4	87.3	89.2
47	73.1	75.1	77.0	78.9	80.8	82.8	84.7	86.6	88.5	90.4
48	74.1	76.1	78.0	79.9	81.9	83.9	85.8	87.7	89.7	91.6
49	75.1	77.0	79.0	81.0	82.9	84.9	86.9	88.9	90.8	92.8
50	**76.0**	**78.0**	**80.0**	**82.0**	**84.0**	**86.0**	**88.0**	**90.0**	**92.0**	**94.0**
51	76.9	78.9	81.0	83.0	85.0	87.0	89.1	91.1	93.1	95.1
52	77.8	79.8	81.9	83.9	86.0	88.1	90.1	92.1	94.2	96.3
53	78.7	80.7	82.8	84.9	86.9	89.1	91.1	93.2	95.3	97.4
54	79.5	81.6	83.7	85.8	87.9	90.0	92.1	94.3	96.3	98.4
55	**80.4**	**82.5**	**84.6**	**86.7**	**88.9**	**91.0**	**93.1**	**95.3**	**97.4**	**99.5**
56	81.2	83.3	85.5	87.6	89.8	92.0	94.1	96.2	98.4	100.6
57	82.0	84.2	86.3	88.5	90.7	92.9	95.1	97.2	99.4	101.6
58	82.8	85.0	87.2	89.4	91.6	93.8	96.0	98.2	100.4	102.6
59	83.6	85.8	88.0	90.2	92.4	94.7	96.9	99.1	101.4	103.6
60	**84.3**	**86.6**	**88.8**	**91.1**	**93.3**	**95.6**	**97.8**	**100.1**	**102.3**	**104.6**
61	85.1	87.4	89.6	91.9	94.1	96.4	98.7	101.0	103.3	105.5
62	85.8	88.1	90.4	92.7	95.0	97.3	99.6	101.9	104.2	106.5
63	86.5	88.9	91.2	93.5	95.8	98.1	100.4	102.7	105.1	107.4
64	87.2	89.6	91.9	94.3	96.6	99.0	101.3	103.6	106.0	108.3

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 4									
	76	78	80	82	84	86	88	90	92	94
65	87.9	90.3	92.7	95.0	97.4	99.8	102.1	104.5	106.8	109.2
66	88.6	91.0	93.4	95.8	98.2	100.6	102.9	105.3	107.7	110.1
67	89.3	91.7	94.1	96.5	98.9	101.3	103.7	106.1	108.5	111.0
68	90.0	92.4	94.8	97.2	99.7	102.1	104.5	106.9	109.4	111.8
69	90.6	93.1	95.5	98.0	100.4	102.9	105.3	107.7	110.2	112.6
70	**91.3**	**93.8**	**96.2**	**98.7**	**101.1**	**103.6**	**106.1**	**108.5**	**111.0**	**113.5**
71	91.9	94.4	96.9	99.3	101.8	104.3	106.8	109.3	111.8	114.3
72	92.5	95.1	97.6	100.0	102.5	105.1	107.5	110.0	112.6	115.1
73	93.2	95.7	98.2	100.7	103.2	105.8	108.3	110.8	113.3	115.9
74	93.8	96.3	98.8	101.4	103.9	106.5	109.0	111.5	114.1	116.6
75	**94.3**	**96.9**	**99.5**	**102.0**	**104.6**	**107.1**	**109.7**	**112.3**	**114.8**	**117.4**
76	94.9	97.5	100.1	102.6	105.2	107.8	110.4	113.0	115.6	118.2
77	95.5	98.1	100.7	103.3	105.9	108.5	111.1	113.7	116.3	118.9
78	96.1	98.7	101.3	103.9	106.5	109.1	111.7	114.4	117.0	119.6
79	96.6	99.3	101.9	104.5	107.1	109.8	112.4	115.0	117.7	120.3
80	**97.2**	**99.8**	**102.5**	**105.1**	**107.7**	**110.4**	**113.0**	**115.7**	**118.4**	**121.0**
81	97.7	100.4	103.0	105.7	108.3	111.0	113.7	116.4	119.0	121.7
82	98.2	100.9	103.6	106.3	108.9	111.7	114.3	117.0	119.7	122.4
83	98.8	101.5	104.2	106.8	109.5	112.3	115.0	117.7	120.4	123.1
84	99.3	102.0	104.7	107.4	110.1	112.9	115.6	118.3	121.0	123.7
85	**99.8**	**102.5**	**105.3**	**108.0**	**110.7**	**113.4**	**116.2**	**118.9**	**121.7**	**124.4**
86	100.3	103.0	105.8	108.5	111.3	114.0	116.8	119.5	122.3	125.1
87	100.8	103.6	106.3	109.0	111.8	114.6	117.4	120.1	122.9	125.7
88	101.3	104.1	106.8	109.6	112.4	115.2	117.9	120.7	123.5	126.3
89	101.7	104.6	107.3	110.1	112.9	115.7	118.5	121.3	124.1	126.9
90	**102.2**	**105.0**	**107.8**	**110.6**	**113.4**	**116.3**	**119.1**	**121.9**	**124.7**	**127.5**
91	102.7	105.5	108.3	111.1	114.0	116.8	119.6	122.4	125.3	128.2
92	103.1	106.0	108.8	111.6	114.5	117.3	120.2	123.0	125.9	128.7
93	103.6	106.5	109.3	112.1	115.0	117.9	120.7	123.6	126.4	129.3
94	104.0	106.9	109.8	112.6	115.5	118.4	121.2	124.1	127.0	129.9
95	**104.5**	**107.4**	**110.2**	**113.1**	**116.0**	**118.9**	**121.8**	**124.7**	**127.6**	**130.5**
96	104.9	107.8	110.7	113.6	116.5	119.4	122.3	125.2	128.1	131.0
97	105.3	108.2	111.2	114.0	116.9	119.9	122.8	125.7	128.6	131.6
98	105.8	108.7	111.6	114.5	117.4	120.4	123.3	126.2	129.2	132.1
99	106.2	109.1	112.0	115.0	117.9	120.9	123.8	126.7	129.7	132.7
100	**106.6**	**109.5**	**112.5**	**115.4**	**118.4**	**121.3**	**124.3**	**127.2**	**130.2**	**133.2**
101	107.0	110.0	112.9	115.9	118.8	121.8	124.8	127.7	130.7	133.7
102	107.4	110.4	113.3	116.3	119.3	122.3	125.2	128.2	131.2	134.2
103	107.8	110.8	113.8	116.7	119.7	122.7	125.7	128.7	131.7	134.8
104	108.2	111.2	114.2	117.2	120.1	123.2	126.2	129.2	132.2	135.3
105	**108.5**	**111.6**	**114.6**	**117.6**	**120.6**	**123.6**	**126.6**	**129.7**	**132.7**	**135.8**
106	108.9	112.0	115.0	118.0	121.0	124.1	127.1	130.1	133.2	136.3
107	109.3	112.3	115.4	118.4	121.4	124.5	127.5	130.6	133.7	136.8
108	109.7	112.7	115.8	118.8	121.8	124.9	128.0	131.0	134.1	137.2
109	110.0	113.1	116.2	119.2	122.3	125.4	128.4	131.5	134.6	137.7
110	**110.4**	**113.5**	**116.5**	**119.6**	**122.7**	**125.8**	**128.9**	**131.9**	**135.1**	**138.2**
111	110.7	113.8	116.9	120.0	123.1	126.2	129.3	132.4	135.5	138.6
112	111.1	114.2	117.3	120.4	123.5	126.6	129.7	132.8	135.9	139.1
113	111.4	114.6	117.7	120.8	123.9	127.0	130.1	133.2	136.4	139.5
114	111.8	114.9	118.0	121.1	124.2	127.4	130.5	133.7	136.8	140.0
115	**112.1**	**115.3**	**118.4**	**121.5**	**124.6**	**127.8**	**130.9**	**134.1**	**137.3**	**140.4**
116	112.5	115.6	118.7	121.9	125.0	128.2	131.3	134.5	137.7	140.9
117	112.8	115.9	119.1	122.2	125.4	128.6	131.7	134.9	138.1	141.3
118	113.1	116.3	119.4	122.6	125.7	129.0	132.1	135.3	138.5	141.7
119	113.4	116.6	119.8	122.9	126.1	129.3	132.5	135.7	138.9	142.1
120	**113.7**	**116.9**	**120.1**	**123.3**	**126.5**	**129.7**	**132.9**	**136.1**	**139.3**	**142.6**

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 3									
	96	98	100	102	104	106	108	110	112	114
5	12.7	12.9	13.1	13.3	13.5	13.6	13.9	14.0	14.2	14.4
6	14.8	15.0	15.2	15.5	15.7	16.0	16.2	16.5	16.7	17.0
7	16.9	17.2	17.5	17.8	18.1	18.4	18.7	19.0	19.3	19.7
8	19.1	19.4	19.7	20.1	20.5	20.9	21.2	21.5	21.9	22.2
9	21.3	21.7	22.1	22.5	22.9	23.4	23.8	24.2	24.6	25.0
10	**23.6**	**24.1**	**24.5**	**25.0**	**25.4**	**25.9**	**26.4**	**26.8**	**27.3**	**27.8**
11	26.1	26.6	27.1	27.6	28.1	28.7	29.2	29.7	30.2	30.7
12	28.6	29.1	29.7	30.3	30.8	31.4	32.0	32.5	33.1	33.6
13	31.0	31.6	32.3	32.9	33.5	34.1	34.7	35.3	36.0	36.6
14	33.5	34.1	34.7	35.4	36.1	36.8	37.4	38.1	38.8	39.4
15	**35.8**	**36.6**	**37.3**	**38.0**	**38.7**	**39.4**	**40.2**	**40.8**	**41.6**	**42.3**
16	38.2	39.0	39.7	40.5	41.2	42.0	42.8	43.5	44.3	45.1
17	40.5	41.3	42.1	42.9	43.8	44.6	45.4	46.2	47.0	47.8
18	42.8	43.7	44.5	45.4	46.3	47.1	48.0	48.8	49.7	50.5
19	45.1	45.9	46.9	47.7	48.6	49.6	50.5	51.4	52.3	53.2
20	**47.2**	**48.2**	**49.1**	**50.1**	**51.0**	**52.0**	**52.9**	**53.9**	**54.8**	**55.8**
21	49.4	50.4	51.4	52.4	53.4	54.4	55.4	56.4	57.3	58.3
22	51.5	52.6	53.6	54.6	55.7	56.7	57.7	58.8	59.8	60.8
23	53.6	54.6	55.8	56.8	57.9	59.0	60.1	61.1	62.2	63.3
24	55.6	56.7	57.8	59.0	60.1	61.2	62.3	63.5	64.6	65.7
25	**57.6**	**58.8**	**59.9**	**61.1**	**62.3**	**63.4**	**64.6**	**65.7**	**66.9**	**68.1**
26	59.5	60.7	61.9	63.2	64.4	65.6	66.8	68.0	69.2	70.4
27	61.5	62.7	64.0	65.2	66.4	67.7	69.0	70.2	71.4	72.6
28	63.3	64.6	65.9	67.2	68.4	69.7	71.1	72.3	73.6	74.9
29	65.1	66.5	67.8	69.1	70.4	71.8	73.1	74.4	75.7	77.1
30	**67.0**	**68.3**	**69.7**	**71.0**	**72.4**	**73.7**	**75.1**	**76.4**	**77.8**	**79.2**
31	68.7	70.1	71.5	72.9	74.2	75.7	77.1	78.4	79.8	81.3
32	70.4	71.8	73.3	74.7	76.1	77.6	79.0	80.4	81.8	83.3
33	72.1	73.6	75.0	76.5	77.9	79.4	80.9	82.3	83.8	85.3
34	73.7	75.2	76.8	78.2	79.7	81.3	82.8	84.2	85.7	87.2
35	**75.4**	**76.9**	**78.4**	**80.0**	**81.5**	**83.0**	**84.6**	**86.1**	**87.6**	**89.2**
36	76.9	78.5	80.1	81.6	83.2	84.8	86.4	87.9	89.5	91.1
37	78.5	80.1	81.7	83.3	84.9	86.5	88.1	89.7	91.3	92.9
38	80.0	81.6	83.2	84.9	86.5	88.2	89.8	91.4	93.1	94.8
39	81.5	83.1	84.8	86.5	88.1	89.8	91.5	93.1	94.8	96.5
40	**82.9**	**84.6**	**86.3**	**88.1**	**89.7**	**91.5**	**93.1**	**94.8**	**96.5**	**98.2**
41	84.4	86.1	87.8	89.6	91.3	93.0	94.8	96.5	98.2	100.0
42	85.8	87.5	89.3	91.1	92.8	94.6	96.4	98.1	99.9	101.6
43	87.1	88.9	90.7	92.5	94.3	96.1	97.9	99.7	101.5	103.3
44	88.5	90.3	92.1	93.9	95.7	97.6	99.4	101.3	103.1	104.9
45	**89.8**	**91.6**	**93.5**	**95.3**	**97.2**	**99.0**	**100.9**	**102.8**	**104.6**	**106.5**
46	91.1	92.9	94.8	96.7	98.6	100.5	102.4	104.3	106.1	108.0
47	92.3	94.2	96.2	98.1	100.0	101.9	103.8	105.7	107.6	109.6
48	93.6	95.5	97.4	99.4	101.3	103.3	105.2	107.2	109.1	111.1
49	94.8	96.7	98.7	100.7	102.7	104.7	106.6	108.6	110.6	112.6
50	**96.0**	**98.0**	**100.0**	**102.0**	**103.9**	**106.0**	**108.0**	**110.0**	**112.0**	**114.0**
51	97.2	99.2	101.2	103.2	105.2	107.3	109.3	111.3	113.3	115.4
52	98.3	100.4	102.4	104.5	106.5	108.6	110.7	112.7	114.7	116.8
53	99.5	101.5	103.6	105.7	107.7	109.8	112.0	114.0	116.1	118.2
54	100.5	102.6	104.7	106.9	108.9	111.1	113.2	115.3	117.4	119.5
55	**101.6**	**103.8**	**105.9**	**108.0**	**110.2**	**112.3**	**114.5**	**116.5**	**118.7**	**120.8**
56	102.7	104.9	107.0	109.2	111.3	113.5	115.7	117.8	120.0	122.1
57	103.8	105.9	108.1	110.3	112.5	114.7	116.9	119.0	121.2	123.4
58	104.8	107.0	109.2	111.4	113.6	115.8	118.1	120.2	122.5	124.7
59	105.8	108.0	110.3	112.5	114.7	117.0	119.2	121.4	123.6	125.9
60	**106.8**	**109.1**	**111.3**	**113.6**	**115.8**	**118.1**	**120.4**	**122.6**	**124.8**	**127.1**
61	107.8	110.1	112.4	114.6	116.9	119.2	121.5	123.7	126.0	128.3
62	108.8	111.0	113.4	115.7	118.0	120.3	122.6	124.9	127.2	129.5
63	109.7	112.0	114.4	116.7	119.0	121.3	123.7	126.0	128.3	130.7
64	110.6	113.0	115.3	117.7	120.0	122.4	124.8	127.1	129.4	131.8

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 3									
	96	98	100	102	104	106	108	110	112	114
65	111.6	113.9	116.3	118.7	121.0	123.4	125.8	128.1	130.5	132.9
66	112.5	114.8	117.2	119.6	122.0	124.4	126.8	129.2	131.6	134.0
67	113.4	115.8	118.2	120.6	123.0	125.4	127.9	130.2	132.6	135.1
68	114.2	116.7	119.1	121.5	123.9	126.4	128.8	131.3	133.7	136.2
69	115.1	117.5	120.0	122.4	124.9	127.4	129.8	132.2	134.7	137.2
70	**115.9**	**118.4**	**120.9**	**123.3**	**125.8**	**128.3**	**130.8**	**133.2**	**135.7**	**138.2**
71	116.8	119.3	121.7	124.2	126.7	129.2	131.8	134.2	136.7	139.3
72	117.6	120.1	122.6	125.1	127.6	130.1	132.7	135.2	137.7	140.2
73	118.4	120.9	123.4	126.0	128.5	131.0	133.6	136.1	138.7	141.2
74	119.2	121.7	124.3	126.8	129.4	132.0	134.5	137.1	139.6	142.2
75	**120.0**	**122.5**	**125.1**	**127.7**	**130.2**	**132.8**	**135.4**	**138.0**	**140.6**	**143.2**
76	120.7	123.3	125.9	128.5	131.1	133.7	136.3	138.9	141.5	144.1
77	121.5	124.1	126.7	129.3	131.9	134.6	137.2	139.8	142.4	145.0
78	122.2	124.8	127.5	130.1	132.7	135.4	138.0	140.6	143.3	146.0
79	123.0	125.6	128.2	130.9	133.5	136.2	138.9	141.5	144.2	146.9
80	**123.7**	**126.3**	**129.0**	**131.7**	**134.3**	**137.0**	**139.7**	**142.4**	**145.0**	**147.7**
81	124.4	127.1	129.8	132.4	135.1	137.8	140.6	143.2	145.9	148.6
82	125.1	127.8	130.5	133.2	135.9	138.6	141.4	144.0	146.7	149.5
83	125.8	128.5	131.2	133.9	136.7	139.4	142.2	144.8	147.6	150.4
84	126.5	129.2	131.9	134.7	137.4	140.2	142.9	145.6	148.4	151.2
85	**127.1**	**129.9**	**132.6**	**135.4**	**138.1**	**140.9**	**143.7**	**146.4**	**149.2**	**152.0**
86	127.8	130.6	133.3	136.1	138.9	141.7	144.5	147.2	150.0	152.8
87	128.5	131.2	134.0	136.8	139.6	142.4	145.2	148.0	150.8	153.6
88	129.1	131.9	134.7	137.5	140.3	143.1	146.0	148.8	151.6	154.4
89	129.8	132.5	135.4	138.2	141.0	143.9	146.7	149.5	152.3	155.2
90	**130.4**	**133.2**	**136.0**	**138.9**	**141.7**	**144.6**	**147.4**	**150.2**	**153.1**	**156.0**
91	131.0	133.8	136.7	139.5	142.4	145.3	148.1	151.0	153.8	156.8
92	131.6	134.4	137.3	140.2	143.0	145.9	148.9	151.7	154.6	157.5
93	132.2	135.1	137.9	140.8	143.7	146.6	149.5	152.4	155.3	158.3
94	132.8	135.7	138.6	141.5	144.4	147.3	150.2	153.1	156.0	159.0
95	**133.4**	**136.3**	**139.2**	**142.1**	**145.0**	**148.0**	**150.9**	**153.8**	**156.7**	**159.7**
96	134.0	136.9	139.8	142.7	145.6	148.6	151.6	154.5	157.4	160.4
97	134.5	137.4	140.4	143.3	146.3	149.3	152.2	155.2	158.1	161.1
98	135.1	138.0	141.0	144.0	146.9	149.9	152.9	155.8	158.8	161.8
99	135.6	138.6	141.6	144.6	147.5	150.5	153.5	156.5	159.5	162.5
100	**136.2**	**139.1**	**142.1**	**145.1**	**148.1**	**151.1**	**154.2**	**157.1**	**160.1**	**163.2**
101	136.7	139.7	142.7	145.7	148.7	151.7	154.8	157.8	160.8	163.9
102	137.3	140.2	143.3	146.3	149.3	152.3	155.4	158.4	161.4	164.5
103	137.8	140.8	143.8	146.9	149.9	152.9	156.0	159.0	162.1	165.2
104	138.3	141.3	144.4	147.4	150.4	153.5	156.6	159.6	162.7	165.8
105	**138.8**	**141.8**	**144.9**	**148.0**	**151.0**	**154.1**	**157.2**	**160.2**	**163.3**	**166.5**
106	139.3	142.4	145.4	148.5	151.6	154.7	157.8	160.8	163.9	167.1
107	139.8	142.9	146.0	149.1	152.1	155.2	158.4	161.4	164.6	167.7
108	140.3	143.4	146.5	149.6	152.7	155.8	158.9	162.0	165.2	168.3
109	140.8	143.9	147.0	150.1	153.2	156.4	159.5	162.6	165.8	168.9
110	**141.3**	**144.4**	**147.5**	**150.6**	**153.7**	**156.9**	**160.1**	**163.2**	**166.3**	**169.5**
111	141.8	144.9	148.0	151.1	154.3	157.4	160.6	163.7	166.9	170.1
112	142.2	145.3	148.5	151.7	154.8	158.0	161.2	164.3	167.5	170.7
113	142.7	145.8	149.0	152.2	155.3	158.5	161.7	164.9	168.0	171.3
114	143.1	146.3	149.5	152.7	155.8	159.0	162.3	165.4	168.6	171.9
115	**143.6**	**146.8**	**149.9**	**153.1**	**156.3**	**159.5**	**162.8**	**165.9**	**169.2**	**172.4**
116	144.0	147.2	150.4	153.6	156.8	160.1	163.3	166.5	169.7	173.0
117	144.5	147.7	150.9	154.1	157.3	160.6	163.8	167.0	170.2	173.5
118	144.9	148.1	151.3	154.6	157.8	161.1	164.3	167.5	170.8	174.1
119	145.4	148.6	151.8	155.1	158.3	161.5	164.8	168.0	171.3	174.6
120	**145.8**	**149.0**	**152.2**	**155.5**	**158.7**	**162.0**	**165.3**	**168.5**	**171.8**	**175.2**

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 2									
	116	118	120	122	124	126	128	130	132	134
5	14.6	14.8	15.0	15.3	15.5	15.7	15.9	16.1	16.3	16.5
6	17.2	17.5	17.8	18.0	18.3	18.5	18.8	19.1	19.4	19.6
7	20.0	20.3	20.6	20.9	21.2	21.5	21.9	22.2	22.5	22.8
8	22.6	23.0	23.3	23.7	24.1	24.5	24.8	25.2	25.6	26.0
9	25.4	25.8	26.2	26.7	27.1	27.6	28.0	28.5	28.9	29.3
10	**28.3**	**28.7**	**29.2**	**29.7**	**30.1**	**30.6**	**31.1**	**31.6**	**32.1**	**32.6**
11	31.3	31.8	32.3	32.8	33.4	33.9	34.5	35.0	35.5	36.0
12	34.3	34.8	35.4	36.0	36.6	37.2	37.8	38.3	38.9	39.5
13	37.2	37.8	38.4	39.1	39.7	40.4	41.0	41.6	42.3	42.9
14	40.1	40.8	41.5	42.2	42.9	43.5	44.3	44.9	45.6	46.3
15	**43.0**	**43.8**	**44.5**	**45.2**	**45.9**	**46.6**	**47.4**	**48.1**	**48.9**	**49.6**
16	45.9	46.6	47.4	48.2	48.9	49.7	50.5	51.3	52.1	52.8
17	48.7	49.4	50.3	51.1	52.0	52.7	53.6	54.4	55.2	56.0
18	51.4	52.3	53.1	54.0	54.9	55.8	56.6	57.4	58.3	59.2
19	54.1	55.0	55.9	56.8	57.7	58.6	59.6	60.5	61.4	62.3
20	**56.8**	**57.7**	**58.6**	**59.6**	**60.6**	**61.5**	**62.5**	**63.4**	**64.4**	**65.4**
21	59.4	60.3	61.3	62.3	63.4	64.3	65.3	66.4	67.3	68.3
22	61.9	63.0	64.0	65.0	66.1	67.1	68.2	69.2	70.2	71.3
23	64.4	65.4	66.5	67.6	68.7	69.8	70.9	72.0	73.0	74.1
24	66.8	67.9	69.1	70.2	71.3	72.4	73.6	74.7	75.8	77.0
25	**69.3**	**70.4**	**71.6**	**72.7**	**73.9**	**75.0**	**76.3**	**77.3**	**78.6**	**79.7**
26	71.6	72.8	74.0	75.2	76.4	77.6	78.8	80.0	81.2	82.4
27	73.9	75.1	76.3	77.6	78.9	80.1	81.3	82.6	83.8	85.1
28	76.2	77.4	78.7	80.0	81.3	82.5	83.9	85.1	86.3	87.6
29	78.3	79.7	81.0	82.3	83.6	84.9	86.3	87.6	88.9	90.2
30	**80.5**	**81.9**	**83.2**	**84.6**	**85.9**	**87.3**	**88.7**	**90.0**	**91.4**	**92.7**
31	82.6	84.1	85.4	86.8	88.2	89.6	91.0	92.4	93.7	95.2
32	84.8	86.2	87.5	89.0	90.4	91.9	93.3	94.7	96.2	97.6
33	86.8	88.2	89.6	91.1	92.6	94.1	95.6	97.0	98.5	99.9
34	88.8	90.3	91.7	93.2	94.7	96.2	97.8	99.3	100.8	102.2
35	**90.7**	**92.3**	**93.8**	**95.3**	**96.9**	**98.4**	**99.9**	**101.5**	**103.0**	**104.5**
36	92.7	94.2	95.8	97.3	98.9	100.4	102.1	103.6	105.2	106.7
37	94.5	96.1	97.7	99.3	100.9	102.5	104.1	105.8	107.4	108.9
38	96.4	98.0	99.6	101.3	102.9	104.5	106.2	107.8	109.4	111.1
39	98.2	99.8	101.5	103.1	104.8	106.5	108.2	109.8	111.5	113.1
40	**100.0**	**101.6**	**103.3**	**105.1**	**106.7**	**108.5**	**110.2**	**111.9**	**113.6**	**115.2**
41	101.7	103.4	105.2	106.9	108.7	110.4	112.1	113.8	115.5	117.2
42	103.4	105.1	106.9	108.7	110.4	112.2	114.0	115.7	117.5	119.3
43	105.1	106.9	108.7	110.5	112.3	114.0	115.9	117.7	119.4	121.2
44	106.7	108.5	110.4	112.2	114.0	115.8	117.7	119.5	121.3	123.1
45	**108.3**	**110.2**	**112.0**	**113.9**	**115.8**	**117.6**	**119.5**	**121.3**	**123.1**	**125.0**
46	109.9	111.8	113.7	115.6	117.5	119.3	121.2	123.1	125.0	126.8
47	111.5	113.4	115.3	117.2	119.1	121.0	122.9	124.9	126.7	128.7
48	113.0	115.0	116.9	118.8	120.8	122.7	124.7	126.6	128.5	130.5
49	114.5	116.4	118.4	120.4	122.4	124.3	126.4	128.3	130.3	132.2
50	**116.0**	**118.0**	**120.0**	**122.0**	**124.0**	**126.0**	**128.0**	**130.0**	**132.0**	**134.0**
51	117.4	119.4	121.5	123.5	125.5	127.5	129.6	131.6	133.6	135.7
52	118.8	120.9	122.9	125.0	127.1	129.1	131.2	133.2	135.3	137.3
53	120.2	122.3	124.4	126.5	128.6	130.6	132.8	134.8	136.9	139.0
54	121.6	123.7	125.8	127.9	130.0	132.1	134.3	136.4	138.4	140.6
55	**123.0**	**125.1**	**127.2**	**129.3**	**131.5**	**133.6**	**135.8**	**137.9**	**140.0**	**142.1**
56	124.3	126.4	128.6	130.7	132.9	135.1	137.3	139.4	141.6	143.7
57	125.6	127.8	129.9	132.1	134.4	136.5	138.8	140.9	143.1	145.2
58	126.9	129.0	131.3	133.5	135.7	137.9	140.1	142.4	144.5	146.7
59	128.2	130.3	132.6	134.8	137.1	139.3	141.5	143.8	146.0	148.2
60	**129.4**	**131.6**	**133.9**	**136.1**	**138.4**	**140.7**	**143.0**	**145.2**	**147.5**	**149.7**
61	130.6	132.9	135.1	137.4	139.7	142.0	144.3	146.6	148.9	151.1
62	131.8	134.1	136.4	138.7	141.0	143.3	145.7	148.0	150.3	152.6
63	133.0	135.3	137.6	140.0	142.3	144.6	147.0	149.3	151.6	153.9
64	134.1	136.5	138.8	141.2	143.5	145.9	148.3	150.6	153.0	155.3

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 2									
	116	118	120	122	124	126	128	130	132	134
65	135.3	137.6	140.0	142.4	144.8	147.1	149.6	151.9	154.3	156.6
66	136.4	138.8	141.2	143.6	146.0	148.4	150.8	153.2	155.6	158.0
67	137.5	139.9	142.3	144.7	147.2	149.6	152.1	154.5	156.9	159.3
68	138.6	141.0	143.4	145.9	148.4	150.8	153.3	155.7	158.2	160.6
69	139.7	142.1	144.6	147.0	149.5	152.0	154.5	156.9	159.4	161.9
70	**140.7**	**143.2**	**145.7**	**148.2**	**150.7**	**153.1**	**155.7**	**158.2**	**160.7**	**163.1**
71	141.8	144.3	146.7	149.3	151.8	154.3	156.8	159.4	161.8	164.4
72	142.8	145.3	147.8	150.4	152.9	155.4	158.0	160.6	163.0	165.6
73	143.8	146.3	148.8	151.4	154.0	156.5	159.1	161.7	164.2	166.8
74	144.8	147.3	149.9	152.5	155.1	157.6	160.2	162.8	165.4	168.0
75	**145.8**	**148.3**	**150.9**	**153.5**	**156.2**	**158.7**	**161.4**	**163.9**	**166.5**	**169.1**
76	146.7	149.3	151.9	154.5	157.2	159.8	162.4	165.0	167.7	170.2
77	147.7	150.3	152.9	155.6	158.2	160.8	163.5	166.1	168.8	171.4
78	148.6	151.2	153.9	156.5	159.2	161.9	164.6	167.2	169.9	172.5
79	149.5	152.2	154.8	157.5	160.2	162.9	165.6	168.3	170.9	173.6
80	**150.5**	**153.1**	**155.8**	**158.5**	**161.2**	**163.9**	**166.6**	**169.3**	**172.0**	**174.7**
81	151.3	154.0	156.7	159.4	162.2	164.9	167.7	170.3	173.1	175.8
82	152.2	154.9	157.6	160.4	163.2	165.9	168.7	171.3	174.1	176.8
83	153.1	155.8	158.5	161.3	164.1	166.8	169.6	172.4	175.1	177.9
84	154.0	156.7	159.4	162.2	165.0	167.8	170.6	173.3	176.1	178.9
85	**154.8**	**157.5**	**160.3**	**163.1**	**166.0**	**168.7**	**171.6**	**174.3**	**177.1**	**179.9**
86	155.6	158.4	161.2	164.0	166.8	169.6	172.5	175.3	178.1	180.9
87	156.5	159.3	162.1	164.9	167.7	170.5	173.4	176.2	179.1	181.9
88	157.3	160.1	162.9	165.8	168.6	171.4	174.4	177.2	180.0	182.9
89	158.1	160.9	163.7	166.6	169.5	172.3	175.2	178.1	181.0	183.8
90	**158.9**	**161.7**	**164.5**	**167.4**	**170.3**	**173.2**	**176.1**	**179.0**	**181.9**	**184.8**
91	159.6	162.5	165.4	168.3	171.2	174.1	177.0	179.9	182.8	185.7
92	160.4	163.3	166.2	169.1	172.0	174.9	177.9	180.8	183.7	186.6
93	161.2	164.0	167.0	169.9	172.9	175.8	178.8	181.7	184.6	187.5
94	161.9	164.8	167.7	170.7	173.7	176.6	179.6	182.5	185.5	188.4
95	**162.7**	**165.6**	**168.5**	**171.5**	**174.5**	**177.4**	**180.5**	**183.4**	**186.4**	**189.3**
96	163.4	166.3	169.3	172.3	175.3	178.2	181.3	184.3	187.2	190.2
97	164.1	167.1	170.0	173.0	176.1	179.0	182.1	185.1	188.1	191.1
98	164.8	167.8	170.8	173.8	176.8	179.8	182.9	185.9	188.9	191.9
99	165.5	168.5	171.5	174.5	177.6	180.6	183.7	186.7	189.7	192.8
100	**166.2**	**169.2**	**172.2**	**175.3**	**178.4**	**181.4**	**184.5**	**187.5**	**190.5**	**193.6**
101	166.9	169.9	172.9	176.0	179.1	182.1	185.3	188.3	191.4	194.4
102	167.6	170.6	173.6	176.8	179.9	182.9	186.0	189.1	192.2	195.3
103	168.2	171.3	174.4	177.5	180.6	183.6	186.8	189.9	193.0	196.0
104	168.9	172.0	175.0	178.2	181.3	184.4	187.5	190.6	193.8	196.9
105	**169.6**	**172.6**	**175.7**	**178.9**	**182.0**	**185.1**	**188.3**	**191.4**	**194.5**	**197.6**
106	170.2	173.3	176.4	179.5	182.7	185.8	189.0	192.1	195.3	198.4
107	170.8	173.9	177.1	180.2	183.4	186.5	189.7	192.9	196.0	199.2
108	171.5	174.6	177.7	180.9	184.1	187.2	190.4	193.6	196.8	199.9
109	172.1	175.2	178.4	181.5	184.8	187.9	191.2	194.3	197.5	200.7
110	**172.7**	**175.8**	**179.0**	**182.2**	**185.4**	**188.6**	**191.9**	**195.1**	**198.2**	**201.4**
111	173.3	176.5	179.6	182.9	186.1	189.3	192.5	195.8	199.0	202.1
112	173.9	177.1	180.3	183.5	186.7	189.9	193.2	196.5	199.7	202.9
113	174.5	177.7	180.9	184.1	187.4	190.6	193.9	197.1	200.4	203.6
114	175.1	178.3	181.5	184.7	188.0	191.3	194.6	197.8	201.1	204.3
115	**175.7**	**178.9**	**182.1**	**185.4**	**188.7**	**191.9**	**195.2**	**198.5**	**201.7**	**205.0**
116	176.2	179.5	182.7	186.0	189.3	192.5	195.9	199.1	202.4	205.7
117	176.8	180.0	183.3	186.6	189.9	193.2	196.5	199.8	203.1	206.4
118	177.4	180.6	183.9	187.2	190.5	193.8	197.2	200.4	203.8	207.1
119	177.9	181.2	184.5	187.8	191.1	194.4	197.8	201.1	204.4	207.7
120	**178.5**	**181.7**	**185.0**	**188.4**	**191.7**	**195.0**	**198.4**	**201.7**	**205.1**	**208.4**

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 1												
	136	138	140	142	144	146	148	150	152	154	156	158	160
5	16.8	17.0	17.2	17.4	17.7	17.9	18.2	18.4	18.6	18.8	19.1	19.3	19.6
6	19.9	20.2	20.5	20.8	21.1	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4
7	23.1	23.5	23.8	24.2	24.6	24.9	25.2	25.5	25.9	26.2	26.6	27.0	27.4
8	26.4	26.7	27.2	27.6	28.0	28.3	28.8	29.1	29.6	30.0	30.4	30.8	31.2
9	29.7	30.2	30.7	31.1	31.5	32.0	32.4	32.9	33.3	33.8	34.3	34.7	35.2
10	33.1	33.6	34.1	34.5	35.1	35.6	36.0	36.6	37.1	37.6	38.1	38.6	39.1
11	36.6	37.1	37.7	38.2	38.8	39.4	39.9	40.5	41.1	41.6	42.2	42.7	43.3
12	40.1	40.7	41.3	41.9	42.5	43.1	43.7	44.3	44.9	45.5	46.1	46.7	47.4
13	43.5	44.2	44.8	45.5	46.1	46.8	47.4	48.1	48.7	49.4	50.1	50.7	51.3
14	46.9	47.7	48.3	49.0	49.8	50.4	51.2	51.8	52.5	53.3	54.0	54.6	55.3
15	50.3	51.1	51.8	52.6	53.3	54.1	54.7	55.5	56.2	57.1	57.8	58.5	59.2
16	53.6	54.4	55.2	56.0	56.7	57.6	58.4	59.2	59.9	60.8	61.5	62.3	63.1
17	56.9	57.7	58.5	59.3	60.2	61.1	61.8	62.8	63.6	64.3	65.2	66.0	66.9
18	60.1	60.9	61.8	62.7	63.6	64.5	65.4	66.2	67.0	68.0	68.9	69.7	70.6
19	63.2	64.2	65.1	66.0	67.0	67.8	68.7	69.7	70.6	71.5	72.5	73.4	74.3
20	66.3	67.3	68.2	69.2	70.2	71.1	72.1	73.0	73.9	74.9	75.9	76.8	77.9
21	69.4	70.3	71.3	72.3	73.3	74.4	75.4	76.3	77.4	78.4	79.4	80.4	81.3
22	72.3	73.3	74.4	75.5	76.5	77.5	78.6	79.7	80.6	81.7	82.8	83.8	84.9
23	75.2	76.3	77.4	78.5	79.5	80.6	81.7	82.9	83.9	85.0	86.1	87.2	88.2
24	78.1	79.2	80.3	81.4	82.5	83.7	84.8	86.0	87.0	88.2	89.3	90.5	91.5
25	80.9	82.0	83.2	84.3	85.6	86.6	87.8	89.1	90.2	91.3	92.5	93.7	94.8
26	83.7	84.8	86.0	87.2	88.5	89.6	90.8	92.1	93.2	94.5	95.6	96.8	98.0
27	86.3	87.5	88.8	90.1	91.3	92.5	93.7	95.1	96.2	97.5	98.7	99.9	101.2
28	89.0	90.2	91.5	92.8	94.1	95.3	96.6	97.9	99.2	100.5	101.8	103.0	104.2
29	91.6	92.8	94.2	95.5	96.8	98.2	99.4	100.7	102.1	103.4	104.7	105.9	107.3
30	94.1	95.4	96.8	98.2	99.5	100.9	102.2	103.5	104.9	106.3	107.6	108.9	110.3
31	96.5	97.9	99.4	100.7	102.2	103.5	104.9	106.3	107.7	109.1	110.5	111.9	113.2
32	99.1	100.4	101.8	103.2	104.7	106.1	107.5	109.0	110.4	111.8	113.3	114.6	116.0
33	101.4	102.9	104.3	105.8	107.2	108.7	110.1	111.7	113.1	114.6	116.0	117.5	118.9
34	103.7	105.2	106.7	108.3	109.8	111.2	112.7	114.3	115.7	117.2	118.7	120.2	121.6
35	106.1	107.5	109.1	110.7	112.1	113.7	115.3	116.8	118.2	119.8	121.4	122.9	124.4
36	108.3	109.9	111.4	113.0	114.6	116.1	117.7	119.3	120.8	122.4	123.9	125.5	127.0
37	110.5	112.1	113.8	115.4	116.9	118.5	120.1	121.7	123.3	124.9	126.5	128.1	129.6
38	112.7	114.3	116.0	117.6	119.3	120.9	122.5	124.1	125.7	127.4	129.0	130.6	132.3
39	114.9	116.5	118.2	119.8	121.5	123.1	124.8	126.5	128.2	129.8	131.5	133.1	134.8
40	116.9	118.6	120.4	122.1	123.7	125.4	127.1	128.8	130.5	132.2	133.9	135.5	137.3
41	119.0	120.8	122.5	124.2	126.0	127.7	129.4	131.1	132.8	134.6	136.3	138.0	139.7
42	121.0	122.7	124.6	126.3	128.1	129.8	131.6	133.4	135.1	136.8	138.6	140.4	142.1
43	123.0	124.8	126.6	128.4	130.2	131.9	133.8	135.5	137.3	139.2	141.0	142.7	144.5
44	125.0	126.8	128.6	130.5	132.3	134.1	135.9	137.7	139.5	141.4	143.2	145.0	146.7
45	126.9	128.7	130.6	132.4	134.3	136.2	138.0	139.9	141.7	143.6	145.4	147.2	149.0
46	128.8	130.6	132.5	134.4	136.3	138.2	140.1	142.0	143.8	145.8	147.6	149.4	151.3
47	130.6	132.5	134.4	136.4	138.3	140.2	142.1	144.0	145.9	147.8	149.7	151.6	153.6
48	132.4	134.4	136.3	138.3	140.2	142.1	144.1	146.0	148.0	150.0	151.8	153.7	155.7
49	134.2	136.1	138.2	140.1	142.1	144.0	146.1	148.0	150.0	152.0	153.9	155.9	157.8
50	136.0	138.0	140.0	142.0	144.0	146.0	148.0	150.0	152.0	154.0	156.0	158.0	160.0
51	137.7	139.7	141.8	143.8	145.8	147.8	149.9	151.9	153.9	156.0	158.0	160.0	162.0
52	139.4	141.4	143.5	145.6	147.6	149.6	151.8	153.8	155.8	157.9	160.0	162.0	164.0
53	141.1	143.1	145.2	147.3	149.4	151.5	153.6	155.7	157.7	159.9	162.0	163.9	166.0
54	142.7	144.8	147.0	149.1	151.2	153.2	155.4	157.5	159.6	161.7	163.8	165.9	168.0
55	144.4	146.5	148.6	150.7	152.9	155.0	157.1	159.3	161.4	163.5	165.7	167.8	170.0
56	145.9	148.0	150.2	152.4	154.5	156.7	158.9	161.1	163.2	165.4	167.6	169.7	171.8
57	147.5	149.6	151.8	154.0	156.3	158.4	160.6	162.8	164.9	167.2	169.4	171.5	173.7
58	149.0	151.2	153.4	155.7	157.9	160.1	162.3	164.5	166.7	169.0	171.2	173.4	175.6
59	150.5	152.8	155.0	157.2	159.5	161.7	164.0	166.3	168.5	170.7	173.0	175.1	177.4
60	152.0	154.3	156.5	158.8	161.1	163.3	165.6	167.9	170.2	172.4	174.7	176.9	179.2
61	153.5	155.7	158.1	160.4	162.6	164.9	167.2	169.5	171.8	174.1	176.5	178.7	181.0
62	154.9	157.2	159.6	161.8	164.2	166.5	168.8	171.1	173.5	175.8	178.1	180.4	182.7
63	156.3	158.6	161.0	163.4	165.7	168.0	170.4	172.7	175.1	177.4	179.8	182.1	184.4
64	157.7	160.1	162.5	164.8	167.2	169.5	172.0	174.3	176.7	179.1	181.4	183.8	186.1

TABLE C (continued)
50-YEAR SITE INDEX TABLE FOR DOUGLAS FIR

BH AGE YEARS	HEIGHT (FEET) BY SITE INDEX FOR SITE CLASS 1												
	136	**138**	**140**	**142**	**144**	**146**	**148**	**150**	**152**	**154**	**156**	**158**	**160**
65	159.1	161.4	163.9	166.3	168.6	171.0	173.4	175.8	178.2	180.7	183.1	185.4	187.8
66	160.5	162.8	165.3	167.7	170.1	172.5	174.9	177.4	179.8	182.2	184.6	187.0	189.5
67	161.8	164.2	166.7	169.1	171.6	174.0	176.4	178.9	181.3	183.8	186.2	188.6	191.1
68	163.1	165.5	168.0	170.5	173.0	175.4	177.9	180.4	182.8	185.3	187.8	190.2	192.6
69	164.4	166.8	169.4	171.8	174.4	176.8	179.3	181.8	184.3	186.8	189.3	191.7	194.3
70	**165.7**	**168.2**	**170.7**	**173.2**	**175.7**	**178.2**	**180.8**	**183.3**	**185.7**	**188.3**	**190.8**	**193.3**	**195.8**
71	167.0	169.4	172.0	174.5	177.0	179.5	182.1	184.7	187.1	189.8	192.2	194.8	197.3
72	168.2	170.7	173.3	175.8	178.4	180.9	183.5	186.1	188.6	191.2	193.8	196.2	198.8
73	169.4	171.9	174.5	177.1	179.7	182.3	184.8	187.4	190.0	192.6	195.2	197.7	200.3
74	170.6	173.1	175.8	178.4	181.0	183.5	186.2	188.8	191.4	194.0	196.6	199.2	201.8
75	**171.8**	**174.3**	**177.0**	**179.6**	**182.2**	**184.8**	**187.5**	**190.1**	**192.7**	**195.4**	**198.0**	**200.6**	**203.2**
76	172.9	175.5	178.2	180.9	183.5	186.1	188.8	191.4	194.1	196.8	199.4	202.0	204.6
77	174.1	176.7	179.4	182.1	184.7	187.4	190.1	192.7	195.4	198.1	200.8	203.4	206.1
78	175.3	177.9	180.6	183.3	185.9	188.6	191.4	194.0	196.7	199.4	202.1	204.8	207.4
79	176.4	179.0	181.8	184.5	187.1	189.8	192.6	195.3	198.0	200.8	203.4	206.1	208.9
80	**177.5**	**180.1**	**182.9**	**185.6**	**188.4**	**191.0**	**193.8**	**196.5**	**199.3**	**202.0**	**204.8**	**207.4**	**210.2**
81	178.5	181.3	184.0	186.8	189.5	192.2	195.0	197.8	200.5	203.3	206.1	208.8	211.5
82	179.6	182.3	185.2	187.9	190.7	193.4	196.2	199.0	201.7	204.6	207.3	210.1	212.9
83	180.7	183.4	186.2	189.0	191.8	194.5	197.4	200.2	203.0	205.8	208.6	211.3	214.1
84	181.7	184.5	187.3	190.1	192.9	195.7	198.6	201.4	204.2	207.0	209.9	212.6	215.4
85	**182.8**	**185.5**	**188.4**	**191.2**	**194.0**	**196.8**	**199.7**	**202.6**	**205.4**	**208.3**	**211.0**	**213.9**	**216.7**
86	183.8	186.6	189.4	192.3	195.1	198.0	200.8	203.7	206.5	209.4	212.3	215.1	217.9
87	184.8	187.6	190.5	193.3	196.2	199.0	202.0	204.8	207.7	210.6	213.5	216.3	219.2
88	185.8	188.6	191.5	194.4	197.3	200.1	203.1	206.0	208.8	211.8	214.6	217.5	220.4
89	186.8	189.6	192.5	195.5	198.4	201.2	204.2	207.1	209.9	212.9	215.8	218.7	221.6
90	**187.7**	**190.6**	**193.5**	**196.4**	**199.4**	**202.3**	**205.2**	**208.2**	**211.1**	**214.0**	**217.0**	**219.9**	**222.8**
91	188.7	191.6	194.5	197.5	200.4	203.3	206.3	209.2	212.1	215.2	218.1	221.0	224.0
92	189.6	192.5	195.5	198.5	201.4	204.3	207.3	210.3	213.2	216.3	219.2	222.1	225.1
93	190.5	193.5	196.4	199.4	202.4	205.4	208.4	211.4	214.3	217.4	220.3	223.3	226.3
94	191.5	194.4	197.4	200.4	203.4	206.4	209.4	212.4	215.4	218.4	221.4	224.4	227.4
95	**192.4**	**195.3**	**198.4**	**201.4**	**204.4**	**207.4**	**210.4**	**213.5**	**216.4**	**219.5**	**222.5**	**225.5**	**228.6**
96	193.3	196.2	199.3	202.3	205.3	208.3	211.4	214.5	217.4	220.5	223.6	226.6	229.7
97	194.2	197.1	200.2	203.3	206.3	209.3	212.4	215.5	218.5	221.6	224.6	227.7	230.7
98	195.0	198.0	201.1	204.2	207.2	210.2	213.4	216.5	219.5	222.6	225.7	228.7	231.8
99	195.9	198.9	202.0	205.1	208.2	211.2	214.3	217.4	220.5	223.6	226.7	229.8	232.9
100	**196.7**	**199.8**	**202.9**	**206.0**	**209.1**	**212.1**	**215.3**	**218.4**	**221.5**	**224.6**	**227.8**	**230.8**	**234.0**
101	197.6	200.6	203.8	206.9	210.0	213.1	216.2	219.3	222.5	225.6	228.7	231.8	235.0
102	198.4	201.5	204.6	207.8	210.9	214.0	217.2	220.3	223.4	226.6	229.7	232.9	236.0
103	199.2	202.3	205.5	208.6	211.8	214.9	218.1	221.2	224.4	227.6	230.8	233.8	237.1
104	200.1	203.1	206.3	209.5	212.7	215.8	219.0	222.2	225.3	228.5	231.7	234.8	238.1
105	**200.8**	**203.9**	**207.2**	**210.3**	**213.5**	**216.6**	**219.9**	**223.1**	**226.2**	**229.5**	**232.7**	**235.8**	**239.1**
106	201.7	204.7	208.0	211.2	214.4	217.5	220.8	224.0	227.2	230.4	233.6	236.8	240.1
107	202.4	205.6	208.8	212.0	215.2	218.4	221.7	224.9	228.1	231.3	234.6	237.8	241.0
108	203.2	206.3	209.6	212.8	216.0	219.2	222.5	225.7	229.0	232.3	235.5	238.7	242.0
109	204.0	207.1	210.4	213.6	216.9	220.1	223.4	226.6	229.9	233.2	236.4	239.6	242.9
110	**204.7**	**207.9**	**211.2**	**214.5**	**217.7**	**220.9**	**224.2**	**227.5**	**230.8**	**234.1**	**237.3**	**240.6**	**243.9**
111	205.5	208.7	212.0	215.2	218.5	221.7	225.1	228.4	231.6	235.0	238.3	241.5	244.8
112	206.2	209.4	212.7	216.0	219.3	222.5	225.9	229.2	232.4	235.8	239.1	242.4	245.7
113	206.9	210.2	213.5	216.8	220.1	223.3	226.7	230.0	233.3	236.7	240.0	243.3	246.7
114	207.7	210.9	214.2	217.5	220.9	224.1	227.5	230.9	234.2	237.5	240.9	244.1	247.6
115	**208.4**	**211.6**	**215.0**	**218.3**	**221.6**	**224.9**	**228.3**	**231.7**	**235.0**	**238.4**	**241.8**	**245.0**	**248.4**
116	209.1	212.3	215.7	219.1	222.4	225.7	229.1	232.5	235.8	239.2	242.6	245.9	249.3
117	209.8	213.0	216.4	219.8	223.2	226.5	229.9	233.3	236.6	240.1	243.4	246.8	250.2
118	210.5	213.8	217.2	220.5	223.9	227.2	230.7	234.1	237.4	240.9	244.3	247.6	251.1
119	211.2	214.4	217.9	221.3	224.6	228.0	231.4	234.9	238.2	241.7	245.1	248.4	251.9
120	**211.8**	**215.1**	**218.6**	**222.0**	**225.4**	**228.7**	**232.2**	**235.6**	**239.0**	**242.5**	**245.9**	**249.3**	**252.7**

TABLE D
Western Hemlock-263 and Mountain Hemlock-264[1]
Upper Limits of Site Indices—Dominant and Codominant Trees
Use for all true firs except white and grand fir and for all cedars except incense

Age years	Site Index																
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	Total height in feet																
10	2	4	4	4	5	6	6	6	8	8	8	9	10	10	11	12	12
20	9	12	14	16	18	20	22	24	26	28	30	32	34	37	39	41	43
30	17	21	24	28	32	36	40	44	47	51	55	59	63	66	70	74	78
40	23	28	34	39	44	50	54	60	66	70	76	81	86	92	96	102	107
50	29	35	42	48	55	61	67	74	80	86	93	99	106	112	118	124	132
60	34	41	49	56	64	71	79	86	93	101	108	116	123	131	138	145	153
70	37	45	53	61	70	78	86	94	103	111	119	127	136	144	152	160	171
80	39	48	57	66	75	84	93	102	110	119	128	137	147	156	164	173	182
90	42	52	61	71	80	90	99	108	118	128	137	146	156	165	175	185	194
100	45	55	65	75	85	95	105	115	125	135	145	155	165	175	185	195	205
110	47	58	68	79	89	99	110	120	131	141	152	162	173	183	194	204	215
120	49	60	70	81	92	103	113	124	135	146	156	167	178	189	199	210	221
130	50	61	72	83	94	105	116	127	138	149	160	171	183	194	205	216	227
140	51	62	74	85	96	107	118	129	141	152	163	174	186	197	208	220	231
150	52	63	75	86	97	109	120	131	143	154	166	177	189	200	212	223	235
160	52	64	76	87	99	110	121	133	145	156	168	179	191	203	214	226	238
180	53	65	77	89	101	112	123	136	148	159	171	183	195	207	219	230	242
200	54	66	78	90	102	113	125	138	150	161	173	186	197	210	221	233	245
220	54	66	78	90	103	114	127	139	151	163	175	187	199	211	224	235	247
240	55	67	79	91	103	115	127	139	152	164	176	188	200	212	225	237	249
260	55	67	79	91	104	116	128	140	152	164	176	188	200	213	225	238	250
280	55	67	80	92	104	116	128	140	153	165	177	189	201	214	226	239	251
300	55	67	80	92	104	117	129	141	153	166	178	190	202	215	227	240	252
Cubic foot site class	7	6	5		4		3		2			1					

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[1] Source: Barnes, George H., 1961. USDA Technical Bulletin 1273. PNW Experiment Station.

TABLE E
White Fir-015
Grand Fir-017[1]
Upper Limits of Site Indices

Age years	Site Index								
	10	20	30	40	50	60	70	80	90
	Total height in feet								
40	11	17	22	28	35	40	46	53	
45	12	21	28	36	45	52	60	69	
50	14	24	35	45	55	65	75	85	
55	17	28	39	50	62	72	84	94	
60	20	32	43	55	68	80	92	104	
65	22	34	46	58	72	85	98	110	
70	24	37	48	62	76	90	104	117	
75	25	39	50	64	79	94	108	122	
80	26	41	52	67	82	97	112	126	
85	27	42	54	69	84	100	116	130	
90	28	44	55	71	87	104	119	134	
95	29	45	56	73	90	106	122	138	
100	30	47	58	75	92	109	125	142	
105	31	48	59	76	94	111	128	144	
110	31	49	60	78	95	113	130	147	
115	32	51	62	79	96	115	132	150	
120	33	52	63	80	98	117	134	152	
125	33	52	64	82	100	118	136	154	
130	34	53	64	83	101	120	138	156	
135	34	53	65	84	102	121	140	158	
140	35	54	66	85	103	122	141	160	
145	35	54	66	86	104	123	142	162	
150	36	55	67	86	105	124	144	163	
Cubic foot site class[2]	7	6		5	4	3		2	

[1] Source: Schumacher, F.X. 1926. University of Calif., Berkeley Bulletin 407.

[2] Cubic foot site class revised in 1974 to agree with equation by Teply, 1971. Data adjusted to eliminate trees 3.5–4.9 inches d.b.h.

TABLE F
Sitka Spruce[1]
Upper Limits of Site Indices—Dominant Trees[2]

Age years		Site Index															
		50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
		Total height in feet															
20	Values less than site index 50	15	17	19	21	23	25	27	30	32	35	37	39	41	43	45	
25		19	22	25	27	32	34	37	40	44	46	49	53	56	59	62	
30		23	28	31	35	39	43	46	50	56	59	62	66	70	74	78	
35		27	32	36	41	46	50	55	61	65	69	73	77	83	88	93	
40		32	37	42	47	53	58	64	70	74	79	85	90	95	101	107	
45		35	41	46	53	59	64	71	77	83	88	94	100	107	113	119	
50		39	45	51	59	65	71	77	85	91	97	103	111	117	124	131	
55		41	48	55	63	69	76	84	90	97	105	111	119	126	132	141	
60		44	51	59	66	73	81	89	96	103	112	119	128	135	141	150	
65		46	55	61	69	77	86	94	102	110	119	127	135	143	150	159	
70		48	57	64	72	80	91	99	108	116	126	134	143	151	159	167	
75		50	59	67	75	85	94	102	112	121	130	139	148	157	163	173	
80		53	62	70	79	89	98	107	116	126	135	144	153	162	171	181	
85		55	65	72	81	92	101	111	120	130	141	149	159	167	178	187	
90		57	67	74	85	94	105	114	124	134	145	154	164	173	189	193	
95		59	69	77	88	98	109	118	129	139	149	159	169	180	190	200	
100		60	70	80	91	101	112	122	133	144	154	164	174	185	195	206	
105		61	71	83	93	103	115	126	137	147	157	167	179	189	201	211	
110		63	73	85	95	106	117	129	141	151	161	171	183	193	205	215	
115		65	75	86	97	109	119	132	144	154	165	175	187	199	210	221	
120		67	77	88	99	111	122	134	147	157	168	180	191	203	215	226	
125		68	78	90	101	113	126	137	149	160	171	184	195	207	219	231	
130		69	79	92	103	116	129	140	151	163	175	187	200	211	223	235	
135		70	81	94	107	119	131	143	155	167	180	191	204	215	228	240	
140		71	84	96	109	122	133	146	158	170	183	195	208	220	233	245	
145		73	86	97	111	123	137	149	161	173	186	199	211	223	237	249	
150		74	87	98	112	124	139	151	163	175	189	202	215	228	241	254	
155		75	88	100	113	127	141	153	165	179	192	205	218	232	244	258	
160		76	90	102	115	129	143	155	168	182	195	208	221	235	248	262	
165		78	91	103	117	130	145	157	170	184	199	211	224	238	252	265	
170		79	92	105	118	132	146	159	172	186	201	214	228	241	255	268	
175		80	93	106	119	133	147	161	174	188	203	216	230	244	257	272	
180		81	94	107	120	134	149	162	176	190	205	218	233	246	260	274	
185		83	94	108	121	137	151	164	179	192	207	220	235	248	263	278	
190		84	95	109	123	138	152	166	181	194	209	222	237	252	266	282	
195		85	96	110	124	139	153	167	182	196	211	225	240	255	269	285	
200		86	97	111	126	141	155	169	184	199	213	228	242	257	272	287	
Cubic foot site class[3]		6	5		4		3		2			1					

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[1] Source: Barnes, George H., 1961. USDA Technical Bulletin 1273. PNW Experiment Station.

[2] Conversion from dominants and codominants by George R. Stabler, Sept. 1, 1948, Occ. Paper 44.

[3] Cubic foot site class revised in 1974 to agree with equation by Teply, 1971. Data adjusted to a 5-inch standard.

TABLE G
Site Index Tables
Engelmann Spruce[1]
Upper Limits of Site Indexes
Dominants and Codominants[2]

Age years	Site Index								
		20	30	40	50	60	70	80	90
		Total height in feet							
20	Values less than site index 20	7	11	16	22	28	33	37	41
25		10	15	22	28	35	41	47	52
30		13	20	27	35	42	49	55	61
35		16	24	32	40	48	56	64	70
40		19	28	37	46	54	63	71	79
45		22	32	41	50	60	69	78	87
50		25	35	45	55	65	75	85	95
55		28	38	49	59	70	80	91	102
60		30	41	52	63	74	85	97	109
65		32	44	55	66	78	89	102	115
70		34	46	58	69	81	93	107	121
75		36	49	60	72	84	97	111	126
80		38	51	62	74	87	100	115	132
85		39	53	64	76	89	103	119	136
90		40	54	66	78	91	106	122	141
95		42	56	68	80	93	108	126	145
100		43	57	69	81	95	111	129	149
105		44	58	70	83	97	113	131	152
110		45	59	71	84	98	115	134	156
115		45	60	72	85	99	116	136	159
120		46	61	73	86	100	118	138	162
125		47	62	74	87	102	119	140	164
130		47	62	74	87	102	120	141	166
135		48	63	75	88	103	121	143	169
140		48	64	76	89	104	122	145	171
145		49	64	76	89	105	123	146	173
150		49	64	76	90	105	124	147	175
155		49	65	77	90	106	125	148	177
160		50	65	77	90	106	125	149	178
165		50	65	78	91	107	126	150	180
170		50	66	78	91	107	127	151	181
175		50	66	78	91	107	127	152	183
180		50	66	78	92	108	128	152	184
185		51	66	78	92	108	128	153	185
190		51	66	78	92	108	128	154	186
195		51	66	79	92	108	129	154	187
200		51	66	79	92	108	129	155	188
Cubic foot site class	7	6		5		4		3	

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[1] Brickell, Jim, letter received July 3, 1968 from Forest Service, INT Moscow.

[2] Conversion from data obtained from INT Station, 1965. Unpublished Memorandum of S. Blair Hutchison dated May 13, 1965.

TABLE H
Site Index Tables
Ponderosa Pine-122[1], Jeffrey Pine-116 and Sugar Pine-117

Age years	Site Index													
		40	50	60	70	80	90	100	110	120	130	140	150	160
		Total height in feet												
20	Values less than site index 40	8	10	14	18	22	28	32	38	42	48	52	58	
25		10	14	18	24	28	34	40	46	51	56	63	69	
30		13	18	23	29	35	41	48	54	60	67	74	80	
35		16	22	28	34	40	46	54	60	67	74	82	88	
40		19	25	32	38	46	52	59	66	74	81	89	96	
45		22	28	36	42	50	57	64	71	79	87	95	102	
50		24	32	39	47	54	62	69	76	84	93	101	109	
55		27	35	42	50	58	66	73	81	89	98	106	114	
60		30	38	46	54	62	70	77	86	94	103	111	120	
65		32	40	49	57	65	73	80	90	98	108	116	125	
70		34	43	52	60	68	76	84	94	103	112	120	130	
75		36	46	54	63	71	80	88	98	107	116	124	134	
80		38	48	56	66	74	84	92	102	111	120	128	138	
85		40	50	57	68	77	87	96	105	114	124	132	142	
90		42	52	62	70	80	90	99	108	118	128	137	147	
95		44	54	64	72	82	92	102	112	122	132	141	151	
100		45	55	65	75	85	95	105	115	125	135	145	155	
105		46	56	66	77	88	98	108	118	128	138	148	159	
110		48	58	68	79	90	100	111	122	132	142	152	163	
115		49	59	70	80	92	103	114	125	136	146	156	166	
120		50	60	72	82	94	106	116	128	140	149	160	170	
125		50	62	73	84	96	108	119	131	142	152	163	174	
130		51	63	74	86	98	110	122	134	145	156	166	177	
135		52	64	76	88	100	112	124	136	148	159	170	180	
140		52	65	77	90	102	114	127	139	151	162	173	184	
145		53	66	78	91	104	116	130	142	154	165	176	187	
150		54	66	80	92	106	118	132	144	157	168	179	190	
155		54	67	81	94	108	120	134	147	160	171	182	193	
160		54	68	82	96	109	122	136	150	162	174	185	196	
165		54	69	83	97	110	124	138	152	165	176	188	198	
170		55	70	84	98	112	126	140	154	168	179	190	201	
175		56	70	85	99	114	128	142	156	170	182	192	204	
180		56	70	86	100	115	129	144	158	172	184	195	206	
185		56	70	86	101	116	130	145	160	174	186	198	208	
190		56	71	87	102	118	132	146	162	176	188	200	210	
195		56	72	88	103	119	134	148	163	178	190	202	212	
200		57	72	88	104	120	136	150	164	180	192	204	214	
Cubic foot site class[2]		7	6			5		4		3		2		1

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[1] Source: Mayer, W.H., 1938. USDA Technical Bulletin 630.

[2] Cubic foot site class revised in 1974 to agree with equation by Teply, 1971. Data adjusted to a 5-inch standard.

TABLE I
Lodgepole Pine - 108[1]
Upper Limits of Site Indices

Age years	Site Index						
	10	20	30	40	50	60	70
	Total height in feet						
20	8	11	14	18	22	26	Values greater than site index 60
25	10	14	18	23	28	33	
30	12	17	22	28	34	40	
35	14	20	26	32	40	47	
40	15	22	29	37	45	54	
45	17	25	32	41	50	60	
50	19	27	35	45	56	66	
55	20	29	38	49	60	71	
60	22	32	41	53	65	76	
65	24	35	44	56	69	81	
70	26	37	46	59	73	86	
75	27	39	48	62	76	90	
80	28	41	51	65	80	94	
85	29	43	53	68	83	98	
90	30	45	55	70	86	101	
95	31	47	56	72	88	104	
100	32	48	58	74	91	107	
105	32	49	59	76	93	110	
110	33	50	60	78	95	112	
115	33	51	61	79	96	114	
120	34	52	62	80	98	116	
125	35	53	62	81	99	117	
130	35	54	63	82	100	118	
Cubic foot site class[2]	7		6			5	

---

[1] Source: Dahms, Walter G., 1964. USFS Research Paper PNW-8.

[2] Cubic foot site class revised in 1974 to agree with equation by Teply, 1971.
Previous site class tables were based on gross yield volumes, new tables are based on net yield volumes.

TABLE L
SITE INDEX TABLE
Douglas Fir - 202 (Southwest Oregon)
Upper Limit Height for Dominant Trees

SITE INDEX

BH AGE YEARS	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140
	Total Height (ft.)																				
20	19	21	23	25	27	30	32	34	36	38	41	43	45	47	49	52	54	56	58	61	63
25	23	25	28	31	33	36	39	41	44	47	50	52	55	58	61	64	66	69	72	75	78
30	26	30	33	36	39	42	46	49	52	55	58	62	65	68	72	75	78	81	85	88	91
35	30	34	37	41	45	48	52	56	59	63	67	71	74	78	82	86	89	93	97	101	105
40	33	38	42	46	50	54	58	62	67	71	75	79	83	88	92	96	100	104	109	113	117
45	37	41	46	51	55	60	64	69	73	78	83	87	92	97	101	106	110	115	120	124	129
50	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140
55	43	49	54	59	65	70	75	81	86	92	97	102	108	113	118	124	129	134	140	145	150
60	46	52	58	63	69	75	81	86	92	98	103	109	115	120	126	132	137	143	149	154	160
65	49	55	61	67	73	79	85	91	98	104	110	116	122	128	133	139	145	151	157	163	169
70	52	58	65	71	77	84	90	96	103	109	115	122	128	134	140	147	153	159	165	171	178
75	54	61	68	74	81	88	94	101	108	114	121	127	134	140	147	153	160	166	173	179	185
80	57	64	71	78	85	92	99	105	112	119	126	133	139	146	153	159	166	173	179	186	193
85	59	66	74	81	88	95	102	109	117	124	131	138	144	151	158	165	172	179	186	193	199
90	61	69	76	84	91	99	106	113	121	128	135	142	149	156	164	171	178	185	192	199	206
95	63	71	79	87	94	102	109	117	124	132	139	146	154	161	168	176	183	190	197	204	211
100	65	73	81	89	97	105	113	120	128	135	143	151	158	165	173	180	188	195	202	209	217
105	67	76	84	92	100	108	116	123	131	139	147	154	162	169	177	185	192	199	207	214	222
110	69	78	86	94	102	110	118	126	134	142	150	158	166	173	181	188	196	204	211	219	226
115	71	79	88	96	105	113	121	129	137	145	153	161	169	177	184	192	200	208	215	223	230
120	73	81	90	98	107	115	124	132	140	148	156	164	172	180	188	196	203	211	219	226	234

Produced by BLM - Medford District.

Source: Hann, David W., and Scrivani, John A., February 1987. Research Bulletin 59, Oregon State University, Forest Research Lab, "Dominant-Height-Growth And Site-Index Equations For Douglas-Fir And Ponderosa Pine In Southwest Oregon," pg. 7 equation, "Estimating Future Heights of Dominant Trees in Hypothetical Stands."

TABLE M
SITE INDEX TABLE
Ponderosa Pine - 122 (Southwest Oregon)
Upper Limit Height for Dominant Trees

SITE INDEX

BH AGE YEARS	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140
	Total Height (ft.)																				
20	18	20	22	24	26	28	30	32	34	36	38	40	43	45	47	49	51	53	55	57	60
25	22	24	27	29	32	35	37	40	42	45	48	50	53	56	58	61	64	66	69	72	74
30	26	29	32	35	38	41	44	47	50	54	57	60	63	66	69	73	76	79	82	85	89
35	29	33	37	40	44	47	51	55	58	62	66	69	73	77	80	84	88	91	95	99	102
40	33	37	41	45	49	53	58	62	66	70	74	78	82	86	91	95	99	103	107	111	116
45	37	41	46	50	55	59	64	68	73	78	82	87	91	96	101	105	110	114	119	124	128
50	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140
55	43	49	54	60	65	70	76	81	87	92	97	103	108	114	119	124	130	135	140	146	151
60	47	52	58	64	70	76	81	87	93	99	104	110	116	122	127	133	139	144	150	156	162
65	50	56	62	68	74	80	87	93	99	105	111	117	123	129	135	141	147	153	159	165	171
70	53	59	66	72	79	85	92	98	104	111	117	124	130	136	143	149	155	162	168	174	180
75	55	62	69	76	83	90	96	103	110	116	123	130	136	143	150	156	163	169	176	182	189
80	58	65	72	80	87	94	101	108	115	122	129	136	142	149	156	163	170	176	183	190	197
85	61	68	76	83	90	98	105	112	119	127	134	141	148	155	162	169	176	183	190	197	204
90	63	71	79	86	94	101	109	116	124	131	139	146	153	160	168	175	182	189	196	204	211
95	65	73	81	89	97	105	113	120	128	135	143	151	158	165	173	180	188	195	202	210	217
100	68	76	84	92	100	108	116	124	132	139	147	155	163	170	178	185	193	200	208	215	222
105	70	78	87	95	103	111	119	127	135	143	151	159	167	174	182	190	197	205	213	220	228
110	72	80	89	97	106	114	122	130	139	147	155	163	171	178	186	194	202	210	217	225	232
115	73	82	91	100	108	117	125	133	142	150	158	166	174	182	190	198	206	214	221	229	237
120	75	84	93	102	111	119	128	136	145	153	161	169	177	185	194	202	209	217	225	233	241

Produced by BLM - Medford District.

Source: Hann, David W., and Scrivani, John A., February 1987. Research Bulletin 59, Oregon State University, Forest Research Lab, "Dominant-Height-Growth And Site-Index Equations For Douglas-Fir And Ponderosa Pine In Southwest Oregon," pg. 7 equation, "Estimating Future Heights of Dominant Trees in Hypothetical Stands."

Basal Area Factor — Card Item 31

Record BAF as a 2-digit code.

Measurement Number — Card Item 31A

Enter 1-digit number for the number of this plot measurement. If this is a new plot installation, enter a zero. If it is the first remeasurement, enter a 1, etc.

Code	Description
0	New plot
1	1st Remeasurement
2	2nd Remeasurement
3	3rd Remeasurement
4	4th Remeasurement
5	5th Remeasurement
6	6th Remeasurement
7	7th Remeasurement
8	8th Remeasurement
9	9th Remeasurement

EXAMPLE: Plot installed 1967, remeasured in 1977 and is now being remeasured in 1987.

ENTER 2

Stand Origin — Card Item 31B

Enter one of the following two codes to best describe the origin of the stand.

Code	Description
1	Natural
2	Planted or seeded

Stand Size Class — Card Item 31C

Enter the 1-digit code for the predominant size of the stand.

Code	Conifer Stand Size Class	Hardwood Stand Size Class
1	Nonstocked	Nonstocked
2	< 5.0" DBH	< 5.0" DBH
3	5.0-8.9" DBH	5.0-10.9" DBH
4	≥ 9.0" DBH	≥ 11.0" DBH

The four classes are defined as follows:

1. NON-STOCKED STANDS: Stands less than 10% stocked with growing-stock trees.
2. SEEDLING-SAPLING STANDS: Stands at least 10% stocked with growing-stock trees, of which more than half consists of saplings and/or seedlings.
3. POLETIMBER STANDS: Stands at least 10% stocked with growing-stock trees, of which more than half must be ≥ 5" DBH, and poletimber stocking must exceed that of sawtimber stocking.
4. SAWTIMBER STANDS: Stands at least 10% stocked with growing-stock trees, of which more than half must be ≥ 5" DBH, and sawtimber stocking must be equal to or exceed poletimber stocking.

Site Productivity Class (Cubic Foot Site Class) — Card Item 31D

From the following codes, select the code representing the cubic foot site productivity class of the plot:

Code	Description
1	225-999 cubic feet/ac/yr
2	165-224 cubic feet/ac/yr
3	120-164 cubic feet/ac/yr
4	85-119 cubic feet/ac/yr
5	50- 84 cubic feet/ac/yr
6	20- 49 cubic feet/ac/yr
7	< 20 cubic feet/ac/yr

SITE PRODUCTIVITY CLASS: A classification of forest lands in terms of inherent capacity to grow crops of industrial wood. The class identifies the average potential growth in cubic feet/acre/year and is based on the culmination of mean annual increment of fully stocked natural stands.

Treatment Opportunity — Card Item 31E

From the following list, select the code that best describes the treatment opportunity:

Code	Description
1	Regeneration without site preparation
2	Regeneration with site preparation
3	Stand conversion
4	Thinning seedlings and saplings
5	Thinning poletimber
6	Other stocking control
7	Other intermediate treatments
8	Clearcut harvest
9	Partial cut harvest
10	Salvage harvest
11	No treatment

TREATMENT OPPORTUNITY CLASS: Identifies the physical opportunity to improve stand conditions through application of management practices.

District Option — Card Item 32

Columns 63-79

TABLE J
Western Larch - 073[1]
Upper Limits of Site Indices

Age years	Site Index - Average Height of Dominant Stand						
		30	40	50	60	70	80
20	Values less than those for Site Index 30	8	10	13	15	17	20
30		18	23	28	34	39	44
40		27	35	43	51	59	67
50		35	45	55	65	75	85
60		41	53	65	76	88	100
70		46	59	72	85	98	112
80		50	65	79	93	108	122
90		54	69	84	100	115	130
100		57	73	89	105	122	138
110		59	76	93	110	127	144
120		61	79	97	114	132	149
130		63	82	100	118	136	154
140		65	84	102	121	140	158
150		66	85	105	124	143	162
160		68	87	107	126	146	165
170		69	89	109	129	149	168
180		70	91	111	131	151	171
190		71	92	112	133	153	173
200		72	93	113	134	155	175
Cubic foot site class	7	6		5		4	3

---

[1] Unpublished data by Art Roe; compiled by Jim Brickell, Intermountain Exp. Sta.

TABLE K
Red Alder-351[1]
(Use for all hardwoods. **Use only on hardwood sites.)**

Upper Limits of Site Indices

Age years	Site Index							
		60	70	80	90	100	110	120
		Total height in feet						
10	Values less than those for site index 60	25	29	33	37	41	45	Values greater than those for site index 110
15		34	40	44	50	55	60	
20		41	47	54	60	66	72	
25		46	54	62	68	76	82	
30		52	60	67	75	83	91	
35		56	64	73	82	90	98	
40		60	68	78	86	96	104	
45		62	72	82	91	100	110	
50		65	75	85	95	105	115	
55		68	78	88	98	109	119	
60		70	80	91	102	112	123	
65		72	82	94	104	116	126	
70		74	84	96	107	118	130	
75		74	86	98	109	120	132	
80		76	88	100	111	123	135	
Cubic foot site class[2]		6	5		4		3	

[1] Source: Worthington, N.P., Johnson, F.A., Stoebler, G.R. and Lloyd, W.S., 1960. PNW Experiment Station Paper 36.

[2] Cubic foot site class revised in 1974 to agree with equation by Teply, 1971. Data changes due to rounding.

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Point Number	III- 4	34

Tree Description

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Tree Tally and Description

Tree Tally Guide

On the inside back cover of these field instructions is a tree tally guide. The guide indicates which card items must be completed for each kind of tree and tree history code.

Tree Tally

On each sample point, trees will be tallied on two kinds of plots—fixed radius and variable radius (prism). The fixed radius plot will sample only trees less than 7.0 inch DBH; the prism plot will sample all trees 7.0 inch DBH and larger.

Order of Tally

Account for all trees tallied on the previous inventory as live trees 1 inch DBH and larger, and all salvable dead trees.

First tally trees on the variable radius plot, then tally 1.0 to 6.9 inch trees on the fixed radius plot. Seedlings will be listed last on each point. New trees should be listed in order of their azimuth from north, even though their assigned tree number will not be sequential with the previously numbered trees.

Trees which have been tallied once will not be numbered again if picked up on other points. The information for such trees will be recorded on subsequent points using the same tree number and tree data (but different azimuth and distance).

Prism Tally

On all points record in sequence clockwise from north all live, mortality and salvable dead trees 7.0 inch DBH and larger that fall within the limiting distance of the prism being used. The limiting distance to the tree is the horizontal distance from the pin to the center of the tree at DBH..

Selection of BAF and Fixed-Plot Radius - Stand density of the stratum being sampled is important in choosing a suitable BAF. In scattered timber or stands 36-75 years of age, select a BAF that will sample at least four trees per point.

Stand Age	**BAF**	**Fixed Plot Radius** (feet)
0-35	30	11.1
36-75	30	11.1
36-75	80	6.8
76+	80	6.8

Table V
Horizontal Limiting Distance

BAF 30		**BAF 80**	
DBH	**Dist.**	**DBH**	**Dist.**
0.1	0.2	0.1	0.1
.2	.3	.2	.2
.3	.4	.3	.3
.4	.6	.4	.4
.5	.8	.5	.5
.6	1.0	.6	.6
.7	1.1	.7	.7
.8	1.2	.8	.8
.9	1.4	.9	.9
1	1.6	1	1.0
2	3.2	2	1.9
3	4.8	3	2.9
4	6.4	4	3.9
5	7.9	5	4.9
6	9.5	6	5.8
7	11.1	7	6.8
8	12.7	8	7.8
9	14.3	9	8.8
10	15.9	10	9.7
11	17.5	11	10.7
12	19.0	12	11.7
13	20.6	13	12.6
14	22.2	14	13.6
15	23.8	15	14.6
16	25.4	16	15.6
17	27.0	17	16.5
18	28.6	18	17.5
19	30.2	19	18.5
20	31.8	20	19.4
21	33.3	21	20.4
22	34.9	22	21.4
23	36.5	23	22.4
24	38.1	24	23.3
25	39.7	25	24.3
26	41.3	26	25.3
27	42.9	27	26.2
28	44.5	28	27.2
29	46.0	29	28.2
30	47.6	30	29.2
31	49.2	31	30.1
32	50.8	32	31.1
33	52.4	33	32.3
34	54.0	34	33.1
35	55.6	35	34.0
36	57.2	36	35.0
37	58.7	37	36.0
38	60.3	38	37.0
39	61.9	39	37.9
40	63.5	40	38.9
41	65.1	41	39.9
42	66.7	42	40.8
43	68.3	43	41.8
44	69.9	44	42.8
45	71.5	45	43.8
46	73.0	46	44.7
47	74.6	47	45.7
48	76.2	48	46.7
49	77.8	49	47.6
50	79.4	50	48.6
51	81.0	51	49.6
52	82.6	52	50.6
53	84.2	53	51.5
54	85.8	54	52.5
55	87.3	55	53.5
56	88.9	56	54.4
57	90.5	57	55.4
58	92.1	58	56.4
59	93.7	59	57.4
60	95.3	60	58.3
Factor = 1.588		Factor = .9723	

Limiting Distance = Factor x DBH (x Slope Correction Factor, if needed).

To convert listed horizontal distances to slope distance, multiply the horizontal distance times the expansion factor below:

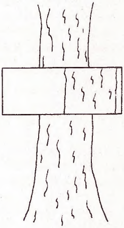
Slope Percent	Slope Correction Factor
10	1.005
15	1.010
20	1.020
25	1.031
30	1.044
35	1.060
40	1.077
45	1.097
50	1.118
55	1.141
60	1.166
65	1.194
70	1.221
75	1.250
80	1.281
85	1.312
90	1.345
95	1.379
100	1.414
105	1.450
110	1.486
115	1.524
120	1.562
125	1.601
130	1.640
135	1.680
140	1.720
145	1.761
150	1.803

NOTE: For a DBH not shown, you may divide the DBH into portions listed in the table and add. Example:

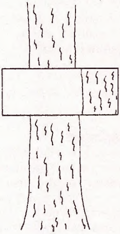
30 BAF, 71.5″ DBH tree — limiting distance = 95.3′ (60″ DBH) + 17.5 (11″ DBH) + 0.8 (0.5″ DBH) = 113.6′.

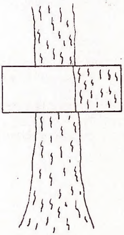
Using wedge prism - Where vegetation of other trees next to the tree in question make it difficult to determine the actual degree of bole displacement, the bole image may be displaced in the opposite direction and more clearly seen by reversing the prism. Use the prism as a guide only. Check all doubtful trees with a tape, determining limiting distance using the limiting distance table found on the previous page. The four possible wedge prism readings are illustrated below:

Incomplete Offset
(record this tree)

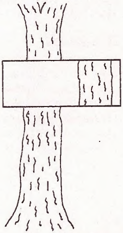


Borderline Tree
(check with tape)



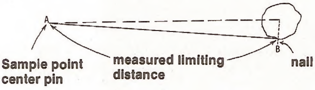


Borderline Tree
(check with tape)



Complete Offset
(do not record)

Borderline Trees - Place a nail at DBH at the side on the tree (Point B in the diagram below) perpendicular to a line from the sample point (Point A) to the tree. Measure the diameter of the tree at this point. Measure the limiting distance (AB), the horizontal distance measured from the sample point center pin to the tree.



The wedge prism principle is based on **horizontal** distances. Where the slope percent reading is over 10 percent from the observer's eye to DBH of the tree in question, correct for slope.

Fixed Radius Plot

All trees less than 7.0 inch DBH will be tallied on a fixed radius plot circumscribed around the center pin. The radius of the plot is determined by the BAF prism used. Measure the plot radius as **horizontal** distance, to the center of the tree at the base.

Saplings and seedlings will be tallied as follows:

Saplings

Trees 1.0 to 6.9 inch DBH (saplings) within the fixed plot will be numbered and tallied in a clockwise order from north and entered on the survey card as individual line entries. All saplings tallied on the previous inventory will be recorded now as either live, dead or cut. Additional live trees that are now sapling size will be given new numbers and tallied in clockwise sequence along with the remeasured saplings.

Seedlings

Trees less than 1.0 inch DBH (seedlings) within the fixed radius will be tallied but not numbered. Count only established seedlings. An established seedling is a tree that is at least **6 inches in height**, with good coloration, no evidence of disease, and with the root system in contact with the soil.

Divide the fixed radius plot into four equal quadrants. In each quadrant tally the dominant conifer seedling and record its azimuth, distance, etc. (see Tally Guide). Count the additional conifer seedlings (regardless of species) within each quadrant and record as Additional Seedlings under CARD ITEM 40 on the same card line.

If no conifer seedlings are present on the plot, tally the dominant hardwood seedling as a single line entry, and record additional seedlings (regardless of hardwood species) as Additional Seedlings under CARD ITEM 40 on the same line. Record hardwood seedlings **only** if there are no conifer seedlings.

If there are **no** trees present on the plot, record point number (CARD ITEM 34) and reference the point under CARD ITEM 8.

Line Number — Card Item 33

Record a 3-digit number for each line in consecutive order. Do not renumber lines as a result of omissions or deletions, since the line number serves only as an edit aid.

Point Number and Replaced Point — Card Item 34

Record a 1-digit point number for **every card entry.**

On remeasured plots only, if the original point is replaced under the rules of substitution, code a "9" in column 12, otherwise, leave column 9 blank (refer to substitution rules on page I-8).

Tree Description

Tree Number — Card Item 35

Record a 3-digit number for all numbered live trees 1.0 inch DBH and larger in columns 13, 14, and 15. On remeasured plots record the same number as used on the previous inventory. If the tree tag is lost or damaged, replace the tag with a new number and list the old tree number in Remarks. No two trees on the plot may have the same number.

With a 2-1/2 inch aluminum nail, place the aluminum tree number on the root collar of the tree, a few inches above the ground and facing the center pin. Drive the nail about 1 inch into the tree.

If a tree is forked and the branches are recorded as individual trees, place a numbered tag under each fork at the base of the tree (illustration in the section "DBH Measurement").

In clumps, all stems 1.0 inch DBH and larger will be numbered.

Azimuth — Card Item 36

Record a 3-digit code for the azimuth of all trees indicated on the tree tally guide.

Azimuth is from the point to tree tag or center of the tree.

Distance — Card Item 37

Record distance to the nearest 1/10-foot—a 3-digit code. Measure the **slope distance** from the center pin to the front of the tree at the tree tag for all trees and stumps.

Examples:

A tree is 5.4 feet from pin — Code 0 5 4

A tree is 32.3 feet from pin — Code 3 2 3

Species — Card Item 38

Record species as a 3-digit code for all trees and stumps tallied. If species were misidentified on the previous inventory, note this under "Remarks."

Table VI
Tree Species List

Code	Softwoods	Code	Hardwoods
202	Douglas-fir	312	Bigleaf Maple
211	Redwood	351	Red alder
		352	White alder
	True Firs	361	Pacific Madrone
		431	Golden chinkapin
011	Pacific Silver fir	492	Pacific dogwood
015	White fir	510	Eucalyptus
017	Grand fir	542	Oregon ash
019	Subalpine fir	631	Tanoak
020	California red fir	660	Apple
021	Shasta red fir	746	Quaking aspen
022	Noble fir	747	Black cottonwood
		760	Cherry
	Pines	805	Canyon live oak
		815	Oregon white oak
101	Whitebark pine	818	California black oak
103	Knobcone pine	821	California white oak
108	Lodgepole pine	920	Willow
116	Jeffrey pine	981	Oregon myrtle
117	Sugar pine	999	All other hardwoods
119	Western white pine		
122	Ponderosa pine		
	Spruce—hemlock		
092	Brewer spruce		
093	Englemann spruce		
098	Sitka spruce		
263	Western hemlock		
264	Mountain hemlock		
	Cedar—larch		
073	Western larch		
041	Port-Orford-cedar		
042	Alaska-cedar		
081	Incense-cedar		
242	Western redcedar		
050	Cypress		
060	All junipers		
231	Pacific yew		

The following species may occasionally attain tree size but will be considered brush and will not be tallied as trees.

Cascara buckthorn *(Rhamnus purshiana)*
Vine maple *(Acer circinatum)*
Mountain maple *(Acer glabrum)*
Douglas maple *(Acer glabrum douglasii)*
Indian plum *(Osmaronia cerasiformis)*
Ocean spray *(Holodiscus discolor)*
Hazel *(Corylus spp.)*
Mountain ash *(Sorbus spp.)*
Sitka alder *(Alnus sinuata)*
Elderberry *(Sambucus spp.)*
Manzanita *(Arctostaphylos spp.)*
Ninebark *(Physocarpus spp.)*
Mountain mahogany *(Cercocarpus spp.)*
Ceanothus *(Ceanothus spp.)*
Red or water birch *(Betula occidentalis)*
Silktassel tree *(Garrya spp.)*
Rhododendron *(Rhododendron spp.)*
Poison-oak *(Toxicodendron spp.)*
Chokecherry and Klamath plum
  Prunis spp. — except P. emarginata)
Serviceberry *(Amelanchier spp.)*
Mockorange *(Philadelphus spp.)*
Arrowwood or moosewood *(Viburnum spp.)*
Creek and redstem dogwoods
  2(Cornus spp., except C. nuttallii)
Hawthorn *(Crataegus)*

Tree History Code Card Item 39

Record a 2-digit tree history code for all trees on both new and remeasured plots.

Code

01 **Live tree** - all prism and fixed-radius trees except 02, 03 and 11 below. Includes all trees 6.9" and less not recorded on previous inventory.

02 **Planted live tree** - same as code 01 but are known to have been **planted**.

03 **Live Tree** - Prism tree 7.0" + DBH that was less than 7.0" DBH on previous inventory (Ingrowth).

04 **Salvable dead tree (down tree)** - Must have at least one 16' log, of which at least 1/3 must be sound wood.

05 **Mortality tree (down tree)** - trees 1.0 inch DBH or larger, which have died **since the previous inventory or within the last 10 years,** whichever is most recent.

08 **Stump of harvested tree** - live or dead tree on previous inventory.

11 **Live tree** - new prism tally tree on remeasurement plot (New growth). Include previously missed trees.

14 **Salvable dead tree (standing)** - Must have at least one 16' log, of which at least 1/3 must be sound wood.

15 **Mortality tree (standing)** - trees 1.0 inch DBH or larger, which have died **since the previous inventory or within the last 10 years,** whichever is most recent.

17 **Live or dead tree in current timber sale.**

20 **SNAG** - Nonsalvable dead prism tree 7.0" + DBH and **not** a mortality tree (code 15).

Definitions

Salvable dead trees (tree history 04, 14) - all dead trees of commercial species, standing or down, 7.0 inch DBH or larger, 16 feet in length or larger and 1/3 or more sound wood in a minimum 8-foot length. If the tree was recorded as a live tree on the previous inventory (01), the same tree will be entered on this inventory as both a tree history 05 or 15 and a tree history 04 or 14 on two line entries.

Mortality trees (tree history 05, 15) - trees 1.0 inch DBH or larger, which have **died due to natural causes since the previous inventory.** Recently windthrown trees which have been **partially uprooted and tipped over** so that they lean 45 degrees or more from vertical will be considered mortality even though the tops are still green. Beetle-attacked trees presently showing widespread foliage discoloration will also be classified as mortality trees.

Stumps (tree history 08) - stumps of a tree harvested since the previous inventory.

Additional Seedlings Card Item 40

Count the additional conifer seedlings (regardless of species) within the quadrant and record under CARD ITEM 40 (see page III-4 for additional discussion).

Crown Ratio Card Item 41

A 1-digit code required for all live prism and fixed-radius tally trees 1.0 inch DBH or larger. Use the following codes:

Crown Ratio Codes

Percent	Code	Percent	Code
1-10	1	51-60	6
11-20	2	61-70	7
21-30	3	71-80	8
31-40	4	81+	9
41-50	5		

Crown Ratio or percent of crown is related to vigor and growth of a tree. Crown Ratio is that portion of the normal tree bole that supports green, live foliage that is effectively contributing to tree growth. It is expressed as a percent of total tree height. Normal tree bole includes dead or broken top portions of the bole.

For trees of uneven crown length, ocularly transfer lower branches on the longer side to fill holes in the upper portion until a full, even crown has been generated.

Crown Class — Card Item 42

Record a 1-digit code for all live trees 1.0 inch DBH or larger.

Code

1 **Open crown** - Trees with crowns which have received light from above and all sides throughout most of the life, particularly during the early development period, and which have not been and are not likely to be influenced as to form or crown shape of other trees.

2 **Dominant** - Trees with crowns extending above the general level of the crown canopy and receiving full light from above and partly from the side; larger than the average trees in the stand, and with crowns dense, comparatively wide and long, but possibly somewhat crowded on the sides.

3 **Codominant** - Trees with crowns forming the general level of the crown canopy and receiving full light from above but comparatively little from the sides; usually with medium-size crowns more or less crowded on the sides.

4 **Intermediate** - Trees shorter than dominants or codominants, with crowns below or barely reaching into the main canopy formed by dominant and codominant trees, receiving a little direct light from above and none from the sides, usually with small crowns considerably crowded on the sides.

5 **Overtopped** - Trees with crowns entirely below the general level of the canopy, receiving no direct light from either above or from the sides.

In multiple-aged stands or even-aged stands with understory trees of younger age classes, direct application of the above definitions is often difficult. The classification into intermediate and overtopped crown classes is intended to include primarily those trees seriously affected by direct competition with adjacent trees.

As a general rule, in two-story or multistory stands, crown class for each tree must be judged in the context of its **immediate environment**, that is, in terms of crown competition. For example, a dominant tree is a tree which generally stands head and shoulders above all other trees in the vicinity. However, there may be a young, vigorous tree nearby but not overtopped by a large dominant tree. The smaller tree may be considerably shorter than the dominant but still be receiving full light from above and partly from the side. **In its own immediate environment, it is dominant and should be recorded as such.** The same principles apply to two-storied stands. Only understory trees immediately adjacent to the overstory tree will be assigned subordinate crown classes. In cases where the overstory consists of scattered veterans standing above larger numbers of younger trees, a considerable portion of the understory trees will be classified as dominant or codominant.

Crown class, as used here, is essentially a classification of competition for light and is aimed at separating trees that are in a position to grow freely from those that are not.

In uneven-aged stands of tolerant species (in which the trees are not in small even-aged groups), trees in the intermediate crown position in the stand and with medium-sized crowns will be considered comparable to codominants of even-aged stands and coded as such.

Tolerant species include grand and white fir in ponderosa pine stands; Englemann spruce in true fir stands; and hemlock and western redcedar in Douglas-fir stands.

Damage/Cause of Death — Card Item 43

Record a 2-digit code for all prism and fixed radius tally trees except tree history 08 and 17.

Damage Codes - Use codes other than **00** in CARD ITEM 43 when something is wrong with the tree which (1) will prevent it from living to maturity, or surviving 10 more years if already mature; or (2) will prevent it from producing marketable products (straight logs of minimum or greater dimensions); or (3) will reduce or has seriously reduced quality of the tree's products (such as may result from lightning strike, excessive lean, etc.); or (4) will result in growth loss.

When a tree is damaged by more than one serious agent, code the most severe. Use the guides on the following pages to decide if a damaging agent is serious enough to be coded.

Cause of Death - Record the **primary** cause of death even when two or more causes may be evident. Thus a tree killed by windthrow but showing evidence of root rot would be coded **20.**

TABLE VII
Damage/Cause of Death Codes for Tree History Codes 01, 02, 03, 04, 05, and 11 (For Trees 7.0"+ DBH with Tree History Codes 14, 15 and 20 see page III-12)

Damage	Damage Code	Death Code
No serious damaging agent	00	—
Insects	—	10
Bark Beetles	11	—
Defoliators	12	—
Balsam wooly aphids	13	—
Sitka spruce weevil	14	—
Spruce budworm	15	—
Disease	—	20
White pine blister rust	21	—
Other rust cankers on main bole	22	—
Other conks on limb or ground near tree	23	—
Phellinus pini conks	24	—
Echinodontium tinctorium conks	25	—
Phaeolus schweinitzii conks	26	—
Other diseases and rot	27	—
Phellinus weirii	29	—
Fire damage	30	30
Animal damage	40	40
Weather damage	—	50
Lightning	51	—
Wind	52	—
Other	53	—
Suppression	—	60
Suppressed seedlings or saplings	69	—
Other damage	—	70
Natural mechanical injury	71	—
Top out, dead, or spike top	72	—
Forked top or multiple stem	73	—
Deformed top above merchantable height	74	—
Needles or leaves short, sparse, or off-color	75	—
Excessive lean over 15°	77	—
Sound cull forked tree	78	—
Killed in cultural operation	—	80
Power equipment damage	81	—
Cutting damage	83	—
Chemical damage	84	—
Killed outright in logging, but not cut down	—	90
Excessive deformity will not produce minimum log	91	—
Hardwood clump	99	—

Insect Damage

Only serious insect damage will be coded. Nearly any tree in the woods will have insects on it at one time or another, but the mere presence of insects does not necessarily indicate the tree is being seriously damaged. Use the following guide in rating serious insect damage.

Code 11 Bark Beetle in Douglas-fir

Needles turning yellow or red over most of tree (tree is dying), boring dust in bark crevices is conspicuous. Older damage is indicated by black pitch streaks in bark over much of bole.

Bark Beetle in Pines

Needles turning yellow to red over most of tree. Small red pitch tubes (less than 1/4 inch in diameter) common. Reddish boring dust in bark flakes and crevices, or around base of tree.

Ips beetle in ponderosa and sugar pine

Tops killed in immature trees. (In some cases, especially in dense stands of saplings, *Ips* beetles may kill every tree in a small area.)

Code 12 Defoliators include:

On pines—needleminers, sawflies, and pandora moth.

On other conifers—tussock moths, sawflies, pine tip moths, pine needle sheathminers, lodgepole needleminers.

Entire crown more than 25 percent defoliated. Top 1/3 of crown more than 50 percent defoliated or discolored. Leader deformed or killed. Current foliage with more than 25 percent of tips discolored or more than 25 percent of needles missing. Many branches with no new shoot growth.

Code any damage on hemlock and grand fir.

Code 13 Balsam wooly aphid

Wooly material or dirty-white encrustation on bark. Slight thinning of crown.

Code any degree of Balsam wooly aphid infestation on all true firs.

On subalpine fir: Trees dying from top down, needles turning bright red. Wooly material or dirty-white encrustation on bark.

On Pacific silver fir: Bell-shaped tops. Foliage thin. Individual branches fading throughout crown. Large branch gouts (knob-like swelling on twig ends).

On grand fir: Flattened umbrella tops. Thinning of old needles. New foliage growth reduced. Internodal branches dead or dying. Severe pitching on mainstem.

Code 14 Sitka spruce weevil

Sitka spruce: Usually attacks trees 6 to 60 feet high. Leaders which have been weeviled currently begin to droop in August (often turn brown).

Current weevil infestation, with drooping leader; one or more side branches assuming dominace. Old damage which has resulted in serious crooks or deformities, if it is weevil caused.

Mere presence of attack on trees 18 feet or taller reflects significant growth loss. Significant deformity on smaller trees indicates serious growth loss.

Continued attack results in a multitopped tree and formation of cross-grained wood with multiple piths. Two to three attacks cause serious loss in height growth.

Code 15 Spruce budworm

Use same criteria for coding as for other defoliators. Not common west of Cascades.

Code 21 White pine blister rust

This disease attacks all Northwest five-needle pines; i.e., white pine, whitebark pine, sugar pine. Code this item when any evidence of the disease is found. The following symptoms may be in evidence in infected trees.

Discolored areas of bark, the outer edges of the discolorations yellowish to orange; or shallow blisters on the bark, which may exude a sticky substance; or the **characteristic spindle-shaped swelling of the stem or branches** accompanied by scaly lesions and black pycnial scars; copious resin exudation from ruptured bark in area of infection.

Code 22 Other rust cankers of the main bole

Code only those cankers which deform the bole, or cause open wounds, or threaten to girdle the tree. Lodgepole pine is often infested with *Peridermium harknessii* "hip" cankers which sometimes kill the tree.

Code 23 Other conks on bole or limb or ground near base of tree

Use the decay estimation guide in Section IV for identifying conks (fungus sporophores), as well as in determining the percent cull caused by the fungus.

Code 24 *Phellinus pini* conks -

white speck rot. Use the decay estimation guide in Section IV.

Code 25 *Echinodontium tinctorium* conks -

Indian paint fungus.
Use the decay estimation guide in Section IV.

Code 26 *Phaeolus schwienitzii* -

Red brown butt rot. Use the decay estimation guide in Section IV.

Code 27 Other diseases and rot

In immature trees code any disease which appears to threaten the tree's chance of developing into a desirable tree at maturity because of top-killing deformity, or decay of bole, or serious reduction of tree vigor. In mature trees, code infections which seriously jeopardize the tree's chance of surviving 10 years.

Examples of other disease and rot

- Needle blights, wilts, and rusts
- Dry rot associated with sunscalds and mechanical damage
- Needle cast
- Scabs and leaf galls
- Diebacks

Code 29 *Phellinus weirii* - Laminated root rot

Primarily in Douglas-fir, also hemlock and true fir. Circular openings in forest with trees jackstrawed. Uprooted trees, many of roots only stubs, stubs often brittle. White mycelia with fine brown hairs which can be seen with hand lens on the bark of roots. Wood covered with small pits and **wood appears layered and peels off like separating pieces of paper.** If stumps, the rot often appears in a crescent or half-moon pattern and laminated around edge of stump. Trees in center of infection with sparse or off-color crowns often indicate presence of disease in roots. In seedling/sapling stands, check stumps of previous stand for presence of *Phellinus weirii* as indication of cause, if seedling/saplings appear to be dying.

Code 30 Fire damage

In coding fire damage, ignore basal scars unless they have killed the cambium on 1/2 or more of the bole circumference, or the **cull** due to large fire scars is sufficient to reduce quality of product or to reduce growth.

In cases where foliage has been killed by fire, do not code fire damage unless the fire-killed foliage reaches into upper 1/3 of crown. Ground fires may kill foliage on lower branches without seriously damaging tree.

Code 40 Animal damage

Code animal damage for trees when 1/2 or more of the bole circumference has been girdled, or when browsing has seriously decimated seedlings or saplings so they will probably not develop into desirable trees.

Code 51 Lighting

Code only damage in immature trees which will reduce quality at maturity or will prevent mature trees from surviving 10 years.

Code 52 Wind

Code only when partial uprooting by wind will prevent the tree from surviving 10 years.

Code 53 Other Weather

Code only damage caused by obvious snowbreak or damage caused by sunscald which will prevent the tree from surviving 10 years.

Code 69 Live suppressed seedling or sapling

Suppressed understory trees are common in old-growth stands, but may occur in second-growth timber, or even as residual trees after logging. Suppressed trees are usually characterized by extremely short or nonexistent internodes, twisted, gnarled stems, short flat crowns of live needles forming "umbrella-shaped" trees or an extreme sparseness of foliage.

Code 71 Natural mechanical damage

Code damage in immature trees which will reduce quality at maturity or will prevent mature trees from living 10 years. Broken limbs in crown caused by other trees falling into them, or boles 1/2 or more girdled by mechanical actions such as the rubbing action of trees in the wind, boulders rolling against bole, etc., will be considered here.

Code 72 Top out or top dead (Spike top)

Code for immature trees. Do not code for mature trees unless more than 10 feet of top is dead or broken out.

Code 73 Forked top or multiple stem

Ignore small double leaders in tall trees but code all major forks or multiple stems. Do not code forks above merchantable height (top diameter) in mature trees.

Code 74 Deformed top above merchantable height

In immature trees, code only when damage will reduce quality of product at maturity. Do not code for mature trees.

Code 75 Needles or leaves noticeably short and/or sparse or off-color

Ignore minor chlorosis or general "redbelting" of trees due to frost conditions (when the needle tips of trees in a large area are tinged). If defoliators are causing sparseness of foliage, CARD ITEM 43 should be Code 12, not 75, and if the needles are off-color because of beetle or a disease attack and it can be conclusively identified as such, CARD ITEM 43 will be coded according to the insect or disease attacking tree. If the insect or pathogen cannot be identified, use Code 75.

Code 77 Excessive lean over 15 degrees from vertical

Code for all trees having this defect regardless of age or size unless a more serious damaging agent is present.

Code 78 Sound cull forked tree

A hardwood tree that forks within the first 8-foot log or a conifer that forks with the first 12-foot log, the main fork of which forks again within 8 or 12 feet, respectively. Do not code cull percent.

Code 81 Power equipment damage

Code as for natural mechanical damage except the damage is caused by powered equipment such as logging cables or tractor skidding.

Code 83 Cutting damage

Code damage by saw or axe which girdles 1/2 of the tree or will prevent the tree from surviving 10 years.

Code 84 Chemical damages

Code damage by chemicals which kills more than 25 percent of entire crown or 50 percent of top 1/3 of crown.

Code 91 Excessive deformity

This code will be used for abnormally squatty trees with abnormal taper, or trees which are severly twisted or gnarled. These trees will not produce a 16-foot log if a conifer, or an 8-foot log if a hardwood. Do not code cull percent.

Code 99 Hardwood clump

Code when tree originates from a clump which has three or more stems originating from same root system. This may occur either through stump sprouts or forking. Record only the largest tree within the clump if the trees are less than 7.0" DBH. Otherwise record all trees 7.0" DBH and larger.

Wildlife Use and Condition Codes[1]

For 7.0" DBH dead, standing trees with Tree History codes 14, 15, and 20, select from the following list the appropriate combination of 1st and 2nd-digit codes, and record in the DAMAGE/CAUSE OF DEATH field (Card Item 43 or Polycorder Item DDTH).

Wildlife Use (1st Digit)		Tree Condition (2nd Digit)	
Code	**Description**	**Code**	**Description**
0	No Activity	1	Recently dead
3	Feeding	2	Loose bark
4	Nesting	3	Clean bole
6	Both feeding and nesting	4	Soft wood
		5	Decomposed wood
		6	Slab

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[1] Reference: "Field Instructions for Managed Stand Surveys, Region 6," USFS, Portland, Oregon, 1987, page VI-37-39.

Dwarf Mistletoe Infection

Card Item 44

Record a 1-digit code for all live prism and fixed radius trees. Use the following guide:

A. No infection present in entire tree, Code: 9

B. Infection present:

1. Divide crown into thirds
2. Score infections in **each** third as follows:

No infection present,	Score: 0
Less than 50 percent of the branches infected, no broom,	Score: 1
50 percent or more of the branches infected, or one or more brooms,	Score: 2

Note: Infections in the bole should be counted as branch infections. Each third of the crown can have a maximum score of 2.

3. Add up the scores for the tree. The maximum score for an infected tree is 6.

Example: A tree has no infection in top third of crown, light infection in the middle third, and nearly all the branches infected in the lower third.

The total score is:

0 + 1 + 2 = 3

Code CARD ITEM 44 as 3.

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Tree Measurements

Past DBH Card Item 45

Record to the nearest 1/10 inch, the past DBH of all variable radius and fixed radius plot trees that were recorded as live trees on the previous inventory. Specific instructions are as follows:

Remeasured Plot

1. **Trees 1.0 inch DBH and larger and alive on previous inventory** - Copy DBH from previous plot card. Includes trees now dead (Tree History 05 and 08).

2. **Trees less than 1.0 inch on previous inventory** - Record past DBH as **0001**.

3. **New Tally Trees**

   Do not record past DBH for seedlings.

   Trees 1.0 to 2.9 inches DBH - Record past DBH as **0001**.

   Trees 3.0 inch DBH and larger - use increment borer to determine past DBH. Record as 0001 if there are less than 10 annual rings.

4. **Stumps of standing live tree on previous inventory**
   Copy DBH from previous plot card.

5. **Tree history code 17 or 18**
   Leave past DBH blank.

New Plot

Do NOT record past DBH on a new plot. Leave CARD ITEM 45 blank.

Present DBH CARD ITEM 46

All card items must have a present DBH recorded. Record present outside-bark DBH as a 4-digit code to the nearest 1/10 inch as follows:

1. **Trees less than 1.0 inch DBH** - Record present DBH as **0001**.

2. **Trees 1.0 inch DBH and larger** - Includes all live trees, salvable dead, mortality, stumps and trees sold but not yet harvested. Record to nearest 1/10 inch.

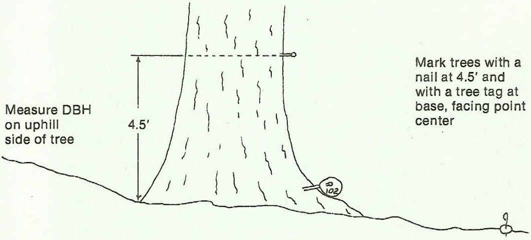
Present DBH can be equal to but never less than past DBH. If after measuring present DBH and comparing with past DBH and the latter is greater, first check present measurement for accuracy, then check the previous plot card to make sure the past DBH has been copied correctly. If both numbers seem correct, erase the past DBH and determine past DBH by using increment borer. The problem of "negative growth" most frequently is caused by DBH being recorded incorrectly on the previous inventory, by bark sloughing off or by a portion of the bole splitting away due to natural or mechanical causes.

Method of Measuring DBH

Diameters will be measured with a diameter tape at a point 4.5 feet above ground level or the root collar on the uphill side of the tree, except as noted for irregularities at DBH.

On all points mark DBH on all trees 3.0 inch DBH and larger with an aluminum nail. All trees should be nailed on the side of the tree facing the sample point center on level ground, or on the uphill side on slopes. Leave as much of the nail exposed as possible, provided it is solidly affixed to the tree.

Measure the diameter directly above the nail that marks DBH. Place diameter nail in tree **before** measuring DBH.



Measure DBH on uphill side of tree

Mark trees with a nail at 4.5' and with a tree tag at base, facing point center

When measuring the present diameter of trees tallied on the previous inventory, look for the original aluminum nail marking DBH. Mark DBH with a new aluminum nail at the same point (or at the same height on uphill side of tree if necessary) and remeasure the diameter at this point. Leave the old nail in the tree.

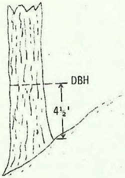
In some cases, the original diameter nail may be completely overgrown or missing. If, after checking carefully, you cannot find the nail, mark and measure the diameter at 4.5 feet above ground level or root collar on the uphill side of the tree.

Measuring DBH in Various Situations

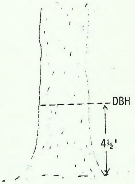
Irregular Trees

In the case of irregularities at DBH, such as swellings, bumps, depressions, branches, etc., diameter will be measured immediately **above** the irregularity at the place where it ceases to affect the normal stem form. Mark the point of measurement with an aluminum nail. Record in the Remarks column of the plot card the height at which DBH is actually measured.

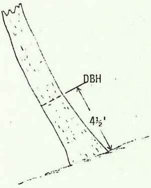
On dead trees that have lost bark due to sloughing, etc., estimate the diameter outside bark at time of death. On downed, salvable dead trees, estimate DBH if it is not measurable.



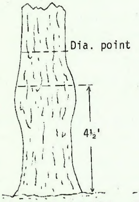
Tree on Slope



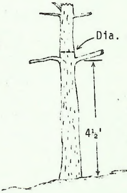
Tree on Level Ground



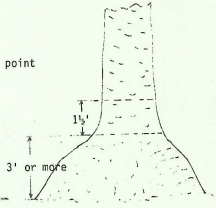
Leaning Tree



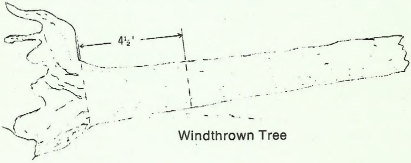
Tree with Swell at 4-1/2'



Tree with Branch at 4-1/2'



Bottleneck Tree



Windthrown Tree

Forked Trees

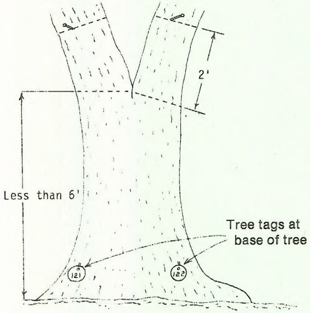
Fork at or above 6.0 feet - Consider as a single tree. Measure the diameter below the swell caused by the fork but as close to 4.5 feet as possible. Consider only the main fork when estimating height and making cull deductions.

Fork below 6.0 feet - Consider each fork a separate tree. A fork will be a **tally tree** on the variable radius plot if the fork is IN where the diameter is measured. A forked tree on the fixed radius is IN if the center of the tree at ground level is within the fixed plot radius.

If the previous crew considered a tree forked, then consider the tree forked.

In all cases, mark the point of measurement as previously specified. Each fork that is a tallied tree will be marked with a tree tag near the base of the tree on the side which the fork occurs.

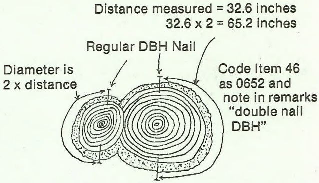
Marking DBH with Aluminum Nails and Attaching Tree Tags



For trees which fork below 6', measure up 2' above crotch and measure diameter.

Trees Grown Together

When two closely spaced trees grow together, they sometimes have the appearance of a forked tree. Such trees should be treated as a separate tree and recorded as such. Diameter will be determined by driving in two nails half-way around the circumference from each other, measuring the distance with a diameter tape, and doubling the result.


Distance measured = 32.6 inches
32.6 x 2 = 65.2 inches
Regular DBH Nail
Diameter is 2 x distance
Code Item 46 as 0652 and note in remarks "double nail DBH"

Diameter Impossible to Measure

If it is physically impossible to measure the diameter of a tree with a diameter tape because of forking, huge root collars, etc., then the diameter will be estimated as follows.

1. Determine where the diameter should be measured and mark if possible.
2. Using a prism or an angle gauge as a guide, move to a point on the ground at which the tree becomes borderline.
3. Measure the horizontal distance from this point on the ground to the center of the tree from that point (limiting distance).
4. Using diameter-limiting distance tables, look up the diameter for that limiting distance.
5. Record this diameter in CARD ITEM 46 and note in Remarks "DBH estimated".

Past Tree Height Card Item 47

Record past tree height for all remeasured trees on remeasured plots only. Record total tree height as a 3-digit code.

If past tree height is greater than present tree height, record past height equal to present height. Do not attempt to estimate how much the tree grew since the previous inventory.

Present Tree Height

Card Item 48

Record as a 3-digit code. Measure the total height to the nearest foot for all trees, both hardwoods and conifers, of all **commercial** species as follows:

> Record total height for all trees except tree history 08 and 17. It may be necessary to project height when part of the tree is missing.

The equations used to compute tree volume are very sensitive to total height, therefore **accurate height measurement is important**. If a height measurement seems unreasonable or if it is taken from a point where visibility of the top or base of the tree is poor, take a second measurement from a better angle. Be sure that the tree does not lean away or toward your point of measurement. Make accurate slope corrections — a 2-foot error in distance can affect height measurement of a tall tree by as much as 4 feet!

Table VIII
Slope Correction Table

Percent	To Convert Slope Dist. to Horizontal Multiply By	Horizontal Distance Desired					
		50′	66′	70′	100′	132′	150′
10	1.00	50.2	66.3	70.4	100.5	132.7	150.8
15	.99	50.5	66.7	70.7	101.0	133.3	151.5
20	**.98**	**51.0**	**67.3**	**71.4**	**102.0**	**134.6**	**153.0**
25	.97	51.6	68.0	72.2	103.1	136.1	154.6
30	.96	52.2	68.9	73.1	104.4	137.8	156.6
35	**.94**	**53.0**	**70.0**	**74.2**	**106.0**	**139.9**	**159.0**
40	.93	53.8	71.1	75.4	107.7	142.2	161.6
45	.91	54.8	72.4	76.8	109.7	144.8	164.6
50	**.89**	**55.9**	**73.8**	**78.3**	**111.8**	**147.6**	**167.7**
55	.88	57.0	75.3	79.9	114.1	150.6	171.2
60	.86	58.3	77.0	81.6	116.6	153.9	174.9
65	**.84**	**59.7**	**78.8**	**83.6**	**119.4**	**157.6**	**179.1**
70	.82	61.0	80.6	85.5	122.1	161.2	183.2
75	.80	62.5	82.5	87.5	125.0	165.0	187.5
80	**.78**	**64.0**	**84.5**	**89.7**	**128.1**	**169.1**	**192.2**
85	.76	65.6	86.6	91.8	131.2	173.2	196.8
90	.74	67.2	88.8	94.1	134.5	177.5	201.8
95	**.72**	**69.0**	**91.0**	**96.5**	**137.9**	**182.0**	**206.8**
100	.70	70.7	93.3	99.0	141.4	186.6	212.1
105	.69	72.5	95.7	101.5	145.0	191.4	217.5
110	**.67**	**74.3**	**98.1**	**104.0**	**148.6**	**196.2**	**222.9**
115	.66	76.2	100.6	106.7	152.4	201.2	228.6
120	.64	78.1	103.1	109.3	156.2	206.2	234.3
125	**.62**	**80.0**	**105.7**	**112.1**	**160.1**	**211.3**	**240.2**
130	.61	82.0	108.2	114.8	164.0	216.5	246.0
135	.60	84.0	110.9	117.6	168.0	221.8	252.0
140	**.58**	**86.0**	**113.5**	**120.4**	**172.0**	**227.0**	**258.0**
145	.57	88.0	116.2	123.3	176.1	232.5	265.2
150	.55	90.2	119.0	126.2	180.3	238.0	270.4

Breast Height Tree Age — Card Item 49

Record as a 3-digit code the **age at breast height** by boring a minimum of five trees on the plot. Record only for live trees of commercial species (codes 01, 02, 03 and 11).

Selected trees should represent the average age of the stand to be managed and preferably should be located on 3 to 5 points. Record CARD ITEM 49 **only** when the actual breast height age of an individual tree is determined. Age for the remaining trees will be assigned through regression analysis.

For all trees less than 4-1/2 feet in height, record **total** tree age.

Determining Age of Large Trees

When determining the age of a tree that has a radius greater than the length of an increment borer, the following procedure will be used:

Bore into tree as far as possible, extract core, and count the rings. Measure the diameter of the tree and divide by two, then subtract the bark thickness. This gives the radius of the wood part of the tree. Measure the length of the core and subtract from the radius of wood to determine how much longer the core would have to be to reach the pith. Count the number of rings in the inner 2 inches and extrapolate to the center. Add this to the ring count on the extracted core.

Example: Determine the age of a Douglas-fir 58.6 inches DBH, having bark thickness of 2 inches when a core 14 inches long has 95 rings and the inner 2 inches has 9 rings.

58.6" ÷ 2 = 29.3" (radius of wood and bark)
29.3" - 2.0" = 27.3" (radius of wood)
27.3" - 14.0" = 13.3" (short of reaching center)
9 ÷ 2" = 4.5 rings per inch
4.5 x 13.3 = 59.8 or 60 rings
95 + 60 = 155 years old at breast height

Record "155" under Card Item 49

Number of Logs — Card Item 51

Record a 2-digit code only if there is tree defect. If no defect, leave this item blank.

For all trees of commercial species that have one or more visible cull indicators, determine the number of logs to the nearest whole log from stump height to minimum top diameter. Use the following specifications of stump heights, log lengths and top diameters:

Size Class	Stump Height (inches)	Log Length (feet)	Minimum Top Diameter Outside Bark
Sawtimber			
Softwoods 7.0+"	12	16	Variable
Hardwoods 7.0+"	12	8	5

DBH (inches)	Top DOB (inches)	DBH (inches)	Top DOB (inches)
7.0 - 18.0	5	62.1 - 66.0	14
18.1 - 22.0	6	66.1 - 74.0	15
22.1 - 30.0	7	74.1 - 78.0	16
30.1 - 34.0	8	78.1 - 82.0	17
34.1 - 38.0	9	82.1 - 90.0	18
38.1 - 46.0	10	90.1 - 94.0	19
46.1 - 50.0	11	94.1 - 98.0	20
50.1 - 54.0	12	98.1 - 104.0	21
54.1 - 62.0	13		

If a softwood sawtimber or hardwood tree is less than minimum length and has any cull deductions, it will be an automatic cull. For this kind of cull, code Damage, CARD ITEM 43 as 91. Do not code numbers of logs or make any cull deductions, CARD ITEMS 51 and 52.

Cull Procedures

Record cull only for commercial species 7.0 inch DBH and larger as follows:

1. **Live Tree** - Record actual cull. A live tree with no merchantable sawlog or peeler volume will be considered a cull tree.
2. **Salvable Dead Tree** - Must have at least one 16-foot merchantable log. The log must have 1/3 sound wood in an 8-foot length.

   Cull for salvable dead (04) is current cull.
3. **Mortality Tree** - Determine percent cull for mortality trees (tree history 05) at time of death or use the data from previous plot card.

A tree 7.0 inch DBH or larger may be recorded as a mortality and a salvable dead tree and have different cull percents.

Log Deduction Codes Card Item 52

The inventory field card permits the recording of the type and amount of defect for five entries.

For each defective log, record a 5-digit code as follows:

Log Affected (1st and 2nd digit)	Cull Indicator (3rd digit)	Amount of Defect (4th and 5th digit)
01-15	1 (top out)	length in feet
01-15	2 (fork)	length in feet
01-15	3 (crook)	length in feet
01-15	4 (sweep)	length in feet
01-15	5 (decay)	length in feet
01-15	5 (seams, scars, etc.)	number of panels
99*	6 (pecky cedar rot)	percent total tree
99*	7 (quinine conk rot)	percent total tree
99*	8 (sapwood rot)	percent total tree
01-15	8(flutes, flanges, etc.)	percent of log

* If a tree has more than five entries, the additional defect may be summed and shown as a percent of the total tree volume. A code 99 in the first 2 digits indicates a percentage deduction for the entire tree and may be used with any single cull indicator code. Since certain types of cull have recoverable cubic volume in the manufacturing process of lumber and plywood, do not combine percentages of defect for different cull indicator codes.

1. Top Out (3rd Digit - Cull Code 1)

Amount of Cull (4th and 5th digits) - Record as a 2-digit code the **length** (01 through 16) in feet of each log missing.

When making cull deductions for loss due to missing tops and forks, first estimate how many logs the tree would have had normally. This can usually be done by looking at normally formed trees in the surrounding stand having the same general diameter. Then estimate the number of logs **now** in the tree (use tallest fork of forked trees when individual forks of such trees are not tallied separately) to determine how many logs were lost. When culling for broken top, cull 4 feet below break for splintering; cull more if there is indication that splintering goes beyond 4 feet.

Example: A sawtimber softwood tree has lost all of log 9 and 8 feet of log 8 of a 9-log tree. Code as follows:

Card Item 51 (No. of logs)	Card Item 52 (Log 8) (Log 9)
09	**08108 09116**

2. Fork (3rd Digit - Cull Code 2)

Amount of Cull (4th and 5th digits) - Record as a 2-digit code the **length** (01 through 16) in feet of log missing due to forking of the main bole.

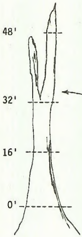
Deduct only for forks within the merchantable length of bolt. Forking usually causes a considerable diameter reduction. The portion of the tree culled will be the equivalent of the logs lost due to the diameter reduction.

Example: A sawtimber softwood tree that would have had four 16-foot logs but has lost an equivalent third log (see sketch) would be coded as follows:

Card Item 51	Card Item 52
04	03216

Had this been a hardwood tree that without forking would have had seven 8-foot logs to a 5-inch top, logs 5 and 6 would be missing. Code as follows:

Card Item 51	Card Item 52
07	05208 06208



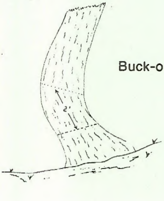
The third 16-foot log or fifth and sixth 8-foot logs are missing due to **diameter reduction of the main stem** caused by the forking.

3. Crook (3rd Digit - Cull Code 3)

Amount of Cull (4th and 5th Digits) - Record a 2-digit code for the **length** (01 through 16) in feet of log bucked out for crook. This a common deduction on pistol-butted trees.

Example: A 4-log conifer has a severe pistol butt causing a 2-foot length deduction in log 1. Code as follows:

Card Item 51	Card Item 52
04	01302



Buck-out for severe crook

4. Sweep (3rd Digit- Cull Code 4)

Amount of Cull (4th and 5th Digits) - Record a 2-digit code for the **length** (01 through 16) in feet of log lost due to the sweep. If the sweep affects more than one log, record the deduction for each log.

Sweep is a gradual curving of the bole over a relatively long length. Sweep compared with crook is less abrupt and more continuous. Varying the bucking lengths of logs will often eliminate most sweep. Two to four feet is usually enough deduction for loss in sawing.

5. Decay, Seams, Scars, Cracks (Cull Code 5)

(a) **Decay** - Fungus diseases such as butt rots, heart rots, trunk rots, and top rots cause extensive volume loss in trees west of the Cascades and in higher elevations east of the Cascades. Field crews should **carefully examine all trees tallied for indications of the presence of these rots.**

Use the guides for estimating decay on the next four pages when recording log deduction codes for decay caused by the more important fungus diseases of the Pacific Northwest. These guides are based on visible indicators. Where hidden internal rot is encountered or suspected, make a careful examination for the presence of indicators.

Decay Deduction - In the fourth and fifth digits record a code 01 through 16 indicating the **length of log** in feet to be culled.

Example: A 7-log conifer has conk rot affecting 4 feet of log 2, all of log 3, and 8 feet of log 4. Code as follows:

Card Item 51	Card Item 52
07	02504 03516 04508

Example: A 200-year old, 10 log Douglas-fir has a **Phellinus pini conk at the top of log 4. Referring to the culling guide for P. pini,** the cull for a 200-year old tree extends 9 feet above and 9 feet below the conk. This would be 9 feet of log 4 and 9 feet of log 5. Code as follows:

Card Item 51	Card Item 52
10	04509 05509

Table IX

Decay Estimation Guide

Fungus	Tree	Visible Indicator	Deduction
Polyporus amarus (pecky cedar rot)	Incense cedar	Conk, shot hole cup	Cull entire tree
Fomitopsis pinicola (Red belt fungus)	Douglas-fir, hemlocks, W. larch, true firs	Conk mostly on dead trees or dead portions of trees	Cull 1 side of tree 6′ below and 4′ above each conk
Poria subacida (butt rot)	Hemlocks, W. white pine, Engelmann spruce, true firs, W. redcedar	Large butt scar, or crust-like, white to buff conk, usually under root crotches	Cull 10′ of one side log (8′ in cedar)
Fomes robutus F. hartigii (concealed conk)	W. Hemlock	Brown crust-like conk on undersurface of branch stub	Cull 16′ of one side of tree only. If 2 opposite conks cull entire 16′ portion.
Gandoderma applanatus (artist's or shelf conk)	W. hemlock, Douglas-fir, Pacific silver fir, Sitka spruce	Shelf-like conk—not common on live trees, usually at wounds	Cull 5′ above and below infection point (scar)
Echinodontium tinctorium (Indian paint fungus)	Hemlocks and true firs; mostly at higher elevations	Dark conk with large spines on lower surface	Use table on next page for cull deductions
Fomitopsis annosa (butt rot)	Hemlocks, white pine, spruce, true firs	Flat or bracket-like conk near root collar	Cull 16′ of butt log
		Infected scar	Cull 4′ above and below infection points
Phaeolus schweinitzii (red brown butt rot)	Douglas-fir, Sitka spruce, W. white pine, lodgepole pine, true firs	Velvety brown conk near base of tree or on the ground	Cull 8′ of butt log
		Conk plus fire scar	Cull to 2′ above top of scar or 8′ of butt log
Fomitopsis cajanderi (top rot) subroseous	Douglas-fir, hemlocks	Small conk with rosy lower surfaces; broken top	Cull top 6′ of the log or 2′ above and below a crook which dictates or top out
Fomitopsis officianalis (Quinine conk)	Douglas-fir, W. larch, ponderosa pine	Conk or rotten branch base	Cull 50 percent of tree volume
Phellinus pini (white speck rot; conk rot) Dull gray or brown, perennial bracket-like or hoof-shaped conk	Douglas-fir: under 140 years	Conk	No cull
	Douglas-fir: over 140 years	Conk	Use the graph on the next page showing extent of decay
		Swollen knots	Cull ½ distance figured for conks
	All pines	Conks	Cull 2′ above and 4′ below each conk
Phellinus igniarius or any other conk or fungus on hardwood trees	All hardwoods	Conk	Cull entire tree

Length Deductions for Trees Possessing E. Tinctorium

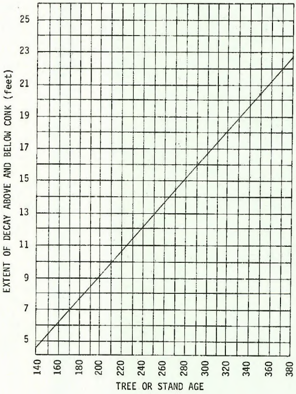
DBH	Distance Above (Feet)	Distance Below (Feet)
5.0-10.9	18	13
11.0-18.9	18	13
19.0-26.9	21	18
27.0-34.9	20	21
35.0-42.9	20	22

Table X

Culling Guide for *Phellinus Pini*

Extent of conk rot above the highest or below the lowest conk

—Douglas-fir, Douglas-fir subregion—



(b) **Seams, Scars, Cracks, Mechanical Trunk Injury (Cull Code 5)** - Indicators of this type usually call for panel deductions rather than linear-foot deductions. Determine the number of panels affected using the following procedure:

a. Divide softwood logs into **four 4-foot sections of length** and each section into 4 quarters lengthwise for a total of 16 panels.

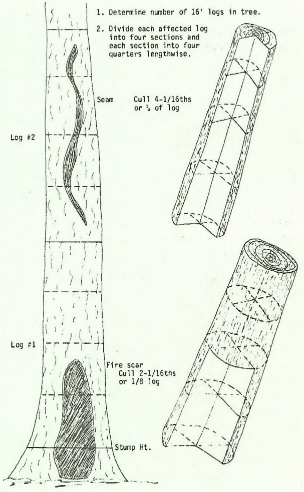
b. Divide hardwood logs into **two 4-foot sections of length** and each section into 4 quarters lengthwise for a total of 8 panels.

c. Record in the 4th and 5th digits, the number of panels culled in each log.

Example: An 8-log conifer has a six foot fire scar covering 2 panels of the butt log, and a seam 14 feet long covering 4 panels of log 2. Code as follows:

Card Item 51	Card Item 52
08	01502 02504

Determining Volume Loss by Sectioning


1. Determine number of 16' logs in tree.
2. Divide each affected log into four sections and each section into four quarters lengthwise.
Seam
Cull 4-1/16ths or ¼ of log
Log #2
Log #1
Fire scar
Cull 2-1/16ths or 1/8 log
Stump Ht.

6. Pecky Cedar Rot (Cull Code 6)

Amount of cull 4th and 5th digits - One conk or shot hole cup of *Polyporus amarus* **conk** indicates the **entire** tree is cull.

Example: A *Polyporus amarus* conk is visible on log 3 of an incense cedar. Code as follows:

Card Item 52
99699

7. Quinine Conk Rot (Cull Code 7)

Amount of cull (4th and 5th digits) - One or more indicators of quinine conk (*Fomitopsis officinalis*) means a flat cull of 50 percent of the tree.

Example: A quinine conk in log 6 would be coded:

Card Item 52
99750

8. Sapwood Rot/Diameter Loss (Cull Code 8)

(a) **Amount of Sapwood Rot in Dead Trees (4th and 5th digits)**
Salvable dead trees (04) will often have lost volume due to sapwood rot. When determining the cull in salvable dead trees, chop or bore into the wood in several places to determine the average depth of sapwood rot, then look up the percent of volume loss in the table on the next page, by the nearest 2-inch diameter class. Record the **percent loss** in the 4th and 5th digits.

Example: A 6-log dead tree 27.8 inches has an average sapwood loss of 2.5 radial inches. The nearest 2-inch class is 28, and the cull, from Table XI, for a 28-inch tree is 35 percent. Code as follows:

Card Item 51	Card Item 52
06	99835

(b) **Amount of Diameter Loss in Live Trees**
Effective scaling diameter reduction in **logs** due to flutes, flanges, and other depressions and numerous small crooks will be accounted for as follows: Estimate the scaling diameter in the log affected before reduction; then estimate the radial inches of the reduction and use Table XI on the next page to determine the percent of loss. Record percent loss as a 2-digit code. Code by the log affected.

Example: A 6-log hardwood has numerous depressions and small crooks that effectively reduce the diameter of the first 16 feet (two 8-foot logs) by 3 inches. DBH is 22 inches and bark thickness 1/2 inch.

1. Estimate DIB at the small end of each 8-foot log:
   Log 1 = 20" (Use 20" in table)
   Log 2 = 19" (Use 18" in table)

2. For each log, look up the percent volume loss in Table XI:
   Log 1 = 30%
   Log 2 = 35%

3. Record as follows:

Card Item 51	Card Item 52
06	01830 02835

Table XI

Volume Loss due to Diameter Reduction

Scaling Diameter Inside Bark	Radial inches of sapwood lost														
	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0
8	30	57	85												
10	30	50	65	80											
12	20	40	55	70	80										
14	15	30	45	60	70	80									
16	15	25	40	50	60	70	85								
18	15	25	35	45	55	60	75								
20	10	20	30	40	50	55	70	80							
22	10	20	30	35	45	50	65	75							
24	10	20	25	35	40	45	60	70	80						
26	10	15	25	30	40	45	55	65	75						
28	10	15	20	30	35	40	50	60	70	80					
30	10	15	20	25	35	40	50	60	70	75					
32	5	15	20	25	30	35	45	55	65	70	80				
34	5	10	20	25	30	35	45	55	60	70	75				
36	5	10	15	20	25	30	40	50	60	65	70	80			
38	5	10	15	20	25	30	40	50	55	65	70	75			
40	5	10	15	20	25	30	40	45	55	60	70	75			
42	5	10	15	20	25	30	35	45	50	60	65	70	75		
44	5	10	15	20	25	25	35	40	50	55	60	70	75		
46	5	10	15	20	20	25	35	40	45	55	60	65	70	75	
48	5	10	15	15	20	25	30	40	45	50	60	65	70	75	
50	5	10	10	15	20	25	30	35	45	50	55	60	65	70	75

Some Examples of Multiple Defects:

1. **Hardwood sawtimber with crook, mechanical injury and fork** - A 19.6 inch bigleaf maple has a 3-foot buck-out crook in log 2, a mechanical trunk injury in log 4, damaging 2 panels and forks at the bottom of what would have been log 7 of a 7-log tree.

Card Item 51	Card Item 52
07	02303 04502 07208

2. **Sawtimber hardwood with sweep and broken out top** - A 30.6 inch 8-log black cottonwood has sweep in log 2 and has lost 3 feet of log 7 and all of log 8 in a recent windstorm. Deduct 2 feet for sweep and use a straight length deduction for the top. Code as follows:

Card Item 51	Card Item 52
08	02402 07103 08108

3. **Dead softwood with crook, topout and sapwood rot** - A 46-inch 9-log Douglas-fir has a 4-foot buck-out crook in log 2, a broken bole in the middle of log 6 that is considered to be the cause of death, and 1/5 inches of sapwood rot.

If this tree is also a mortality (died since last inventory), it will be entered on two lines, one line for salvable dead (tree history 04) and one line for mortality (tree history 05). The codes for each are as follows:

For the mortality, cull only for crook, since the topout and sapwood loss occurred at the time of death.

Tree History	Card Item 51	Card Item 52
05	09	02304

For the salvable dead cull, record as follows:

Tree History	Card Item 51	Card Item 52
04	09	02304 06112 07116 08116 (crook) (break) (top out) 09116 99815 (top out) (saprot)

Because CARD ITEM 52 only has five entries, the entries must be combined as follows:

Combine extra logs and defect by converting the 8th and 9th logs to percent of total tree volume using Table XII on page IV-14: log 8 of a 9-log tree = 4%, log 9 of a 9-log tree = 2%.

Combine 4% and 2% and record as follows:

Card Item 52

02304 06112 07116 99106 99815

This procedure may be used to combine as many logs as necessary for their accommodation in the entries provided.

The same tree may also be recorded by combining the 6th, 7th, 8th and 9th logs as follows:

Card Item 52

02304 99120 99815

4. **Softwood sawtimber with sweep and conk in same log** - A 36.1 inch 7-log white fir has 6 inches of sweep departure in log 1 and an **Echinodontium tinctorium** conk 9 feet above the stump. First consider the conk rot using the decay guide. For a DBH of 36 inches, make linear log deduction 20 above and 22 feet below the conk. This takes out all of log 1 and 13 feet of log 2. Since the rot makes a complete cull of log 1, ignore the sweep in the log and code as follows:

Card Item 51	Card Item 52
07	1516 01516 02513

Table XII

Percentage distribution of total tree volume
By 16-foot logs

No. of Logs	Log Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 log	100														
2	84	16													
3	59	34	7												
4	44	34	17	5											
5	37	29	19	12	3										
6	30	26	19	14	8	3									
7	26	22	19	14	11	6	2								
8	23	20	18	14	11	8	3	2							
9	21	17	16	13	11	9	7	4	2						
10	19	17	15	13	11	9	7	5	3	1					
11	17	15	14	12	11	9	7	6	5	3	1				
12	16	14	13	11	11	9	8	6	5	4	2	1			
13	15	13	12	11	10	9	8	7	5	4	3	2	1		
14	13	12	12	10	9	9	8	7	6	4	4	3	2	1	
15	12	12	11	10	9	9	8	7	6	5	4	3	2	1	1

By 8-foot logs

No. of Logs	Log Number 1	2	3	4	5	6	7	8	9	10	11	12
1 log	100											
2	55	45										
3	41	33	26									
4	33	28	22	17								
5	28	24	20	16	12							
6	25	22	18	15	12	8						
7	22	20	17	14	12	9	6					
8	20	18	16	14	11	9	7	5				
9	18	17	15	13	11	9	7	6	4			
10	17	16	14	12	10	9	8	6	5	3		
11	16	15	13	12	10	9	8	6	5	3	3	
12	15	14	13	12	10	9	8	6	5	3	3	2

Table XIII

Percent Tree Volume in Fractions of Logs

	Fractions of Logs To Be Deducted														
	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16
2	0	0	0	0	1	1	1	1	1	1	1	2	2	2	2
3	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3
4	0	1	1	1	1	2	2	2	2	2	3	3	3	4	4
5	0	1	1	1	2	2	2	2	3	3	3	4	4	4	5
6	0	1	1	2	2	2	3	3	3	4	4	4	5	5	6
7	0	1	1	2	2	3	3	4	4	4	5	5	6	6	7
8	0	1	2	2	2	3	4	4	4	5	6	6	6	7	7
9	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8
10	1	1	2	2	3	4	4	5	6	6	7	8	8	9	9
11	1	1	2	3	3	4	5	6	6	7	8	8	9	10	10
12	1	2	2	3	4	4	5	6	7	8	8	9	10	10	11
13	1	2	2	3	4	5	6	6	7	8	9	10	11	11	12
14	1	2	3	4	4	5	6	7	8	9	10	10	11	12	13
15	1	2	3	4	5	6	7	8	8	9	10	11	12	13	14
16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
17	1	2	3	4	5	6	7	8	10	11	12	13	14	15	16
18	1	2	3	4	6	7	8	9	10	11	12	14	15	16	17
19	1	2	4	5	6	7	8	10	11	12	13	14	15	17	18
20	1	2	4	5	6	8	9	10	11	12	14	15	16	18	19
21	1	3	4	5	6	8	9	10	12	13	14	16	17	18	20
22	1	3	4	6	7	8	10	11	12	14	15	16	18	19	21
23	1	3	4	6	7	9	10	12	13	14	16	17	19	20	22
24	2	3	4	6	8	9	11	12	13	15	16	18	20	21	22
25	2	3	5	6	8	9	11	12	14	16	17	19	20	22	23
26	2	3	5	6	8	10	11	13	15	16	18	20	21	23	24
27	2	3	5	7	8	10	12	14	15	17	18	20	22	24	25
28	2	4	5	7	9	10	12	14	16	18	19	21	23	24	26
29	2	4	5	7	9	11	13	14	16	18	20	22	24	25	27
30	2	4	6	8	9	11	13	15	17	19	21	22	24	26	28
33	2	4	6	8	10	12	14	16	19	21	23	25	27	29	31
34	2	4	6	8	11	13	15	17	19	21	23	25	28	30	32
37	2	5	7	9	12	14	16	18	21	23	25	28	30	32	35
41	3	5	8	10	13	15	18	20	23	26	28	31	33	36	38
44	3	5	8	11	14	16	19	22	25	27	30	33	36	38	41
45	3	6	8	11	14	17	20	22	25	28	31	34	37	39	42
55	3	7	10	14	17	21	24	28	31	34	38	41	45	48	52
59	4	7	11	15	18	22	26	29	33	37	41	44	48	52	55
84	5	10	16	21	26	31	37	42	47	52	58	63	68	73	79
100	6	12	19	25	31	38	44	50	56	62	69	75	81	88	94

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Appendix

Appendix **Page**

A Field Card Sample V-2
B Guide for Completing Side One of Plot Card V-4
C Transect Sampling V-5

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

BLM FOREST INVENTORY SAMPLE RECORD

PAGE ______ OF ______

10	RESOURCE MANAGEMENT AREA	1 2 3	
11	PLOT NUMBER	4 5 6	
12	CARD TYPE	7	1
13	SAMPLE KIND	8	
14	COUNTY	9 10	
15	LAND STATUS	11	
16	TOWNSHIP	12 13 14	
17	RANGE	15 16 17	
18	SECTION	18 19	
19	O.I. SURVEY UNIT NUMBER	20 21 22	
20	DATE OF PAST SURVEY	23 24 25 26	
21	DATE OF CURRENT SURVEY	27 28 29 30	
22	PREDICTED O.I. STRATA	31 32	
23	OBSERVED O.I. STRATA	33 34	
24	PRESENT LAND USE	35 36	
25	PAST LAND USE	37 38	
26	FOREST TYPE	39 40	
27	PHYSIO CLASS ASPECT SLOPE TOPOG. POSITION	41 42 43	
28	ELEVATION	44 45	
29	STAND AGE	46 47 48	
30	SITE TREE SPECIES	49 50 51	
30	SITE INDEX	52 53 54	
31	BASAL AREA FACTOR	55 56	
31 A	MEAS. NO.	57	
31 B	STAND ORIGIN	58	
31 C	STAND SIZE CLASS	59	
31 D	PRODUCTIVITY CLASS	60	
31 E	TREATMENT OPPORTUNITY	61 62	
32	DISTRICT OPTION	63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79	

1. ESTIMATOR ______

RECORDER ______

DATE ______

2. DECLINATION ______

3. PHOTOS

Scale ______

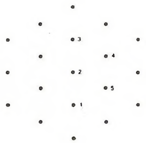
Year ______ Symbol ______

Roll ______ Photo Nos. ______

4. EDIT

FIELD	OFFICE

5. PLOT LAYOUT



6. ROUTE TO REFERENCE POINT AND PLOT

______

______

______

______

______

______

______

______

7. RP TO PLOT

	SPP	DBH	AZ	DIST
R.P. TREE 1.				
Additional R.P.'s: 2.				
3.				

8. POINT REFERENCE

PT	SPP	DBH	AZ	DIST
1				
1				
2				
2				
3				
3				
4				
4				
5				
5				

9. PRESENT STAND CONDITION—PAST DISTURBANCE—OTHER NOTES

______

______

______

______

______

30. SITE TREES

SPP	AGE	HT	S.I.

SITE TABLE:

* GPO 693-701 1982

Card columns	Field	Field no.
1 2 3	RESOURCE MANAGEMENT AREA	10
4 5 6	PLOT NUMBER	11
7 (2)	CARD TYPE	12

REMARKS

Card columns	Field	Field no.
8 9 10	LINE NUMBER	33
11 12	POINT NUMBER REPLACED POINT	34
13 14 15	TREE NUMBER	35
16 17 18	AZIMUTH	36
19 20 21	DISTANCE	37
22 23 24	SPECIES	38
25 26	TREE HISTORY	39
27 28	ADDITIONAL SEEDLINGS	40
29	CROWN RATIO	41
30	CROWN CLASS	42
31 32	DAMAGE/ CAUSE OF DEATH	43
33	DWARF MISTLETOE	44
34 35 36 37	PAST DBH	45
38 39 40 41	PRESENT DBH	46
42 43 44	PAST TREE HEIGHT	47
45 46 47	PRESENT TREE HEIGHT	48
48 49 50	BREAST HEIGHT TREE AGE	49
51 52		50
53 54	NUMBER OF LOGS	51
55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79	LOG DEDUCTION CODES	52

Appendix B GUIDE FOR COMPLETING SIDE 1 OF FIELD CARD

Forest Land

Item	Field	Card columns	Entry
10	RESOURCE MANAGEMENT AREA	1 2 3	XXX
11	PLOT NUMBER	4 5 6	XXX
12	CARD TYPE	7	▨
13	SAMPLE KIND	8	X
14	COUNTY	9 10	XX
15	LAND STATUS	11	X
16	TOWNSHIP	12 13 14	XXX
17	RANGE	15 16 17	XXX
18	SECTION	18 19	XX
19	O.I. SURVEY UNIT NUMBER	20 21 22	XXX
20	DATE OF PAST SURVEY	23 24 25 26	RRRR
21	DATE OF CURRENT SURVEY	27 28 29 30	XXXX
22	PREDICTED O.I. STRATA	31 32	XX
23	OBSERVED O.I. STRATA	33 34	XX
24	PRESENT LAND USE	35 36	XX
25	PAST LAND USE	37 38	RR
26	FOREST TYPE	39 40	XX
27 PHYSIO CLASS	ASPECT SLOPE TOPOG. POSITION	41 42 43	XXX
28	ELEVATION	44 45	XX
29	STAND AGE	46 47 48	XXX
30	SITE TREE SPECIES	49 50 51	XXX
	SITE INDEX	52 53 54	XXX
31	BASAL AREA FACTOR	55 56	XX
31A 31B	MEAS. NO. STAND ORIGIN	57 58	XX
31C 31D	STAND SIZE CLASS PRODUCTIVITY CLASS	59 60	XX
31E	TREATMENT OPPORTUNITY	61 62	XX
32	DISTRICT OPTION	63 64	XX
		65 66	XX
		67 68 69	XXX

Also complete Card Items 1-9.

R = Record on remeasured plots only

Noncommercial and Nonforest Land

Item	Field	Card columns	Entry
10	RESOURCE MANAGEMENT AREA	1 2 3	XXX
11	PLOT NUMBER	4 5 6	XXX
12	CARD TYPE	7	▨
13	SAMPLE KIND	8	X
14	COUNTY	9 10	XX
15	LAND STATUS	11	X
16	TOWNSHIP	12 13 14	XXX
17	RANGE	15 16 17	XXX
18	SECTION	18 19	XX
19	O.I. SURVEY UNIT NUMBER	20 21 22	XXX
20	DATE OF PAST SURVEY	23 24 25 26	RRRR
21	DATE OF CURRENT SURVEY	27 28 29 30	XXXX
22	PREDICTED O.I. STRATA	31 32	XX
23	OBSERVED O.I. STRATA	33 34	XX
24	PRESENT LAND USE	35 36	XX
25	PAST LAND USE	37 38	RR
26	FOREST TYPE	39 40	NN
27 PHYSIO CLASS	ASPECT SLOPE TOPOG. POSITION	41 42 43	XXX
28	ELEVATION	44 45	XX
29	STAND AGE	46 47 48	
30	SITE TREE SPECIES	49 50 51	
	SITE INDEX	52 53 54	
31	BASAL AREA FACTOR	55 56	
31A 31B	MEAS. NO. STAND ORIGIN	57 58	
31C 31D	STAND SIZE CLASS PRODUCTIVITY CLASS	59 60	
31E	TREATMENT OPPORTUNITY	61 62	
32	DISTRICT OPTION	63 64	
		65 66	
		67 68 69	

Also complete Card Items 1-7 and 9.

N = Record only on Noncommercial plots

Appendix C

Establishment and Location of the Transect Samples

Four transect samples will be established for each field plot to collect information on down dead woody material. This survey is based on the planar intersection technique of sampling which involves the establishment of vertical sample planes of known lengths that traverse the plot area. Down material intersected by these planes is then tallied and categorized when appropriate.

These transects will be located along the interpoint traverses used to establish sample points on a standard plot layout. The transects extend in a straight line between point centers. The stakes marking the sample point centers are used to define the beginning and ending points of each transect. The entire length of each transect must sample the same vegetative condition or land class as point 1.

Field Procedures

1. On a standard plot layout, the transects will be between points 1-2, 2-3, 3-4, and points 4-5.

2. Establishing transects on plots with substitute points, proceed to the lowest numbered point (regular or substitute) and layout the transect between the initial point and the next lowest numbered point established within 70 feet of the starting point. For example, transects will be established in the following order for the diagram on page I-9.

Segment No.	Starting Point	Ending Point
1	1	5
2	2′	3
3	2′	4′
4	3	4′

3. If the plot arrangement is such that the above procedures result in establishing less than four transects, use the following to locate the additional transects required:

   a) From the highest numbered substitute point, proceed at zero (0°) azimuth and establish a transect 70 feet long. If an acceptable transect can not be located at zero azimuth, rotate clockwise at 60° intervals until an acceptable transect can be established.

      An acceptable transect is one that is in the same timber type as the inventory plot.

   b) If the transect can not be located off the highest numbered substitute point, then proceed to the next highest numbered substitute point and establish the transect using the procedures outlined above.

4. Define the location of the transect by stretching a tape between the stakes used to mark the centers of the designated sample points. The sample plane is then visualized as passing along one edge of the tape. This tape must extend in a straight line between points and, once established, should not be moved until the tally for the transect has been completed. Use caution and do not disturb material along this line.

5. Visualize the sample plane as passing along one edge of the tape and extending from the bottom of the litter layer to a height six feet above the ground surface. Litter is the surface layer of the ground which consists of vegetative debris that has not been incorporated into the duff or mineral soil through decomposition. The duff layer begins at the point where vegetative debris has noticeably begun to decompose.

6. Use the following procedures to identify down woody material which qualifies for tally. Start at the point marking the beginning of the transect and work towards the sample point at the end. Tally and record each piece sequentially as individual entries on the Polycorder.

Tally Rules

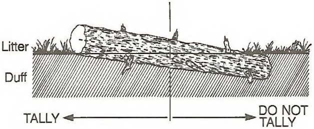
Pieces intersected by the sample plane which meet the following qualifications will be tallied and recorded as part of the transect sample.

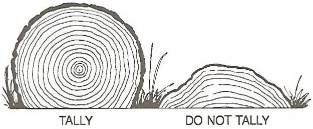
1. Down dead woody material consists of dead tree boles, limbs and other woody pieces that have been severed from their original source of growth and have fallen to the ground. This includes uprooted tree boles and any stems or branches attached to them. It does not include:

   a. Standing trees, stumps or shrubs.
   b. Dead stems or branches **attached** to standing trees, stumps or shrubs.
   c. Dead foliage, bark or other non-woody pieces which are not an integral part of a bole or limb (i.e. bark attached to a portion of a down log would be tallied as part of that log).

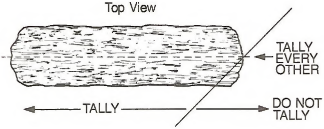
2. Down woody material **7.0 inches in diameter or larger** at the point where it is intersected by the sample plane and a minimum of 8 feet in length will be tallied for each transect sample.

3. Tally the piece only if the central longitudinal axis is intersected by the sample plane and at that point 50% or more of the piece is above the duff layer. A piece which is above the duff layer has distinct form and can definitely be distinguished from the ground.



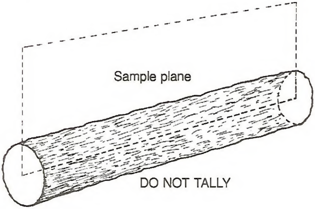


4. If the central axis is exactly crossed (at the end of a piece) count every other such intersection.

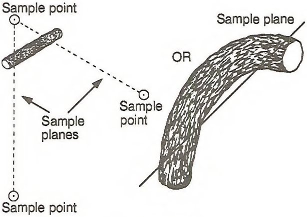


5. Material whose central axis is more than six feet above the ground surface at the point of plane intersection does not qualify for tally.

6. Do not tally the piece if the central axis is exactly parallel to and coincides with the sample plane. This should rarely happen.



7. If the central axis of a piece is intersected more than once, tally it each time it is intersected.



TALLY TWICE

8. Tally wood slivers and chunks left after logging if they meet the minimum size requirements.

9. Tally uprooted stumps and roots not encased in dirt. For tallying, consider uprooted stumps as tree boles or individual roots, depending on where the sampling planes intersect the stumps. Do not tally undisturbed stumps.

10. Be sure to look up from the ground when sampling because downed material can be tallied up to 6 feet.

Segment (Transect) Identification

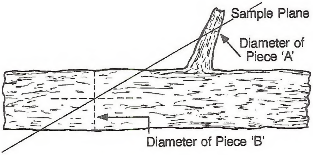
Identify transect number for each piece tallied. **When no tally occurs** on a transect, one line entry is required. On this line, record RMA/PLOT, strata, segment, and record species as code '000'.

Species Codes

Use standard species codes located on page III-5. When no tally occurs on a segment (transect) record species as '000'.

Diameter at Point of Plane Intersection

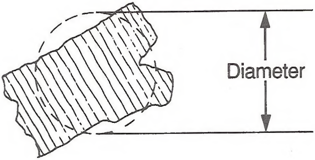
Record species, diameter, length, and condition for all down woody pieces tallied on the transect samples. Field crews will determine and record the diameter of the piece at the point where its central longitudinal axis is intersected by the sample plane.



Measuring Diameter at Point of Plane Intersection

A diameter tape may be used to make this measurement. A ruler, laid perpendicular to the piece may also be used if parallax is avoided and if the piece is circular in cross section. No adjustments in the point of measurement will be made for irregularities encountered at the intersection point.

Wood slabs and other noncircular pieces should be visually molded into cylinders in order to determine diameter as shown below:



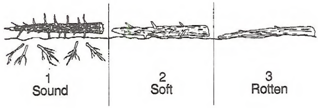
Diameter at point of plane intersection need not be marked with an aluminum nail. If desired, a shallow axe cut or similar mark may be used.

Record Diameter at Point of Plane Intersection and length for all qualifying **pieces 7.0 inches diameter and larger** and a minimum of 8 feet in length. Record the diameter of each piece to the nearest whole inch and length to the nearest foot.

Recording Condition Codes for Down Woody Material

Condition codes will be assigned based on the characteristics of the piece observed at the point of plane intersection. The following codes will be used based on these general characteristics:

	Bark	Limbs	Texture	Shape	Color of Wood	Portion on Ground
Code 1 Sound	Intact	Present	Mostly Sound	Round	Original Color	Elevated On Support Points
Code 2 Soft	Loose or Missing	Mostly Absent	Sapwood Decay Present	Round	Original To Faded	All To Mostly Sagging
Code 3 Rotten	Usually Absent	Branch Stubs Loose	Interior Decay Present	Round To Oval	Faded	All Of Piece On Ground



No tally on a transect sample.

When there are no pieces tallied on a transect sample, one line entry will be used. On this line identify RMA/PLOT, strata, and segment number. Record species as '000' and proceed to the next segment.

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R = Remeasured Plot Only

* Code 9 on substitute point
on remeasured plot only.
All others, code is blank.

	34 POINT NUMBER 11	REPLACED POINT ✦ 12	35 TREE NUMBER 13 14 15	36 AZIMUTH 16 17 18	37 DISTANCE 19 20 21	38 SPECIES 22 23 24	39 TREE HISTORY 25 26	40 ADDITIONAL SEEDLINGS 27 28	41 CROWN RATIO 29	42 CROWN CLASS 30	43 DAMAGE/ CAUSE OF DEATH 31 32	44 DWARF MISTLETOE 33	45 PAST DBH 34 35 36 37	46 PRESENT DBH 38 39 40 41	47 PAST TREE HEIGHT 42 43 44	48 PRESENT TREE HEIGHT 45 46 47	49 BREAST HEIGHT TREE AGE 48 49 50	50 PAST PERCENT CUBIC DEFECT 51 52	51 NUMBER OF LOGS 53 54	52 **LOG DEDUCTION CODES** 55 56 57 58 59
- Live Trees -																				
SEEDLINGS	X	R		XXX	XXX	XXX	01/02	XX			XX	X		0001		XXX	XXX			
SAPLINGS 1.0 - 6.9" DBH	X	R	XXX	XXX	XXX	XXX	01/02		X	X	XX	X	RRRR	XXXX	RRR	XXX	XXX			
SAWTIMBER 7.0"+ DBH	X	R	XXX	XXX	XXX	XXX	01/03		X	X	XX	X	RRRR	XXXX	RRR	XXX	XXX	XX	XX	XXXXX
NEW PRISM TREE 7.0"+ DBH	X	R	XXX	XXX	XXX	XXX	11		X	X	XX	X		XXXX		XXX	XXX		XX	XXXXX
- Dead or Sold Trees -																				
SALVABLE DEAD 7.0"+ DBH	X	R	XXX	XXX	XXX	XXX	04				XX			XXXX		XXX		RR	XX	XXXXX
MORTALITY 1.0"+ DBH	X	R	XXX	XXX	XXX	XXX	05				XX		RRRR	XXXX	RRR	XXX		RR*	XX	XXXXX
TREE IN SALE OR STUMP	X	R	XXX	XXX	XXX	XXX	08/11							XXXX						
CHIP VOLUME ONLY	X	R	XXX	XXX	XXX	XXX	18							XXXX		XXX			XX	XXXXX
NONCOMMERCIAL SPECIES 1.0"+ DBH	X	R		XXX	XXX	XXX	01							XXXX						

* Only mortality trees 7.0"+ DBH

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